WESTERN GAS

THIS LITTLE FIGURE

IS ALL SET TO BOOST THE SALES FIGURES OF MODERN GAS RANGES

You'll see him go to work in the pages of the SATURDAY EVENING POST

beginning September 21

THIS LITTLE ROBOT DIAL WATCHES OVER YOUR COOKING
SET
THIS DIAL
MEAL-GETTING EASIER WHEN ROBOT DIAL DO THE COOKING FOR YOU
BETTER-TASTING MEALS GO ON THE TABLE WHEN THIS ROBOT DIAL IS ON THE RANGE
ROBERTSHAW

Once again, ad after ad puts the story of Robertshaw before millions of women:

But the importance of the Robertshaw dial is presented more forcefully than ever before!

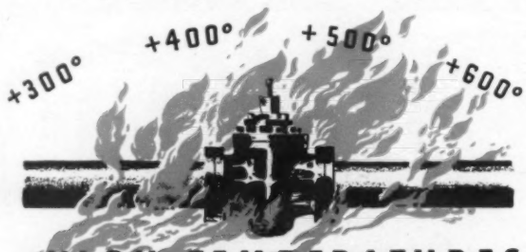
Each ad will carry the little Robertshaw robot figure shown above. He will spotlight the big contribution Robertshaw oven-heat-control makes to the range. He will be a symbol of cooking-freedom—a symbol all women will know.

When the gas range is equipped with Robertshaw, its oven performance is backed by Robertshaw standards of manufacture—its sales are backed by the force of Robertshaw national advertising.

ROBERTSHAW THERMOSTAT COMPANY
YOUNGWOOD, PA.

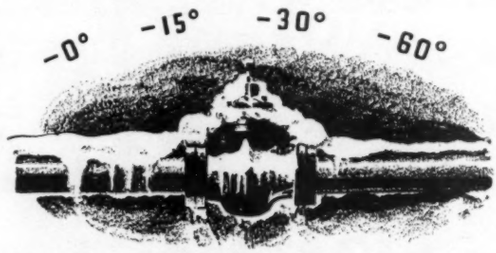
ROBERTSHAW OVEN-HEAT-CONTROL

SPEAKING OF *Extremes*



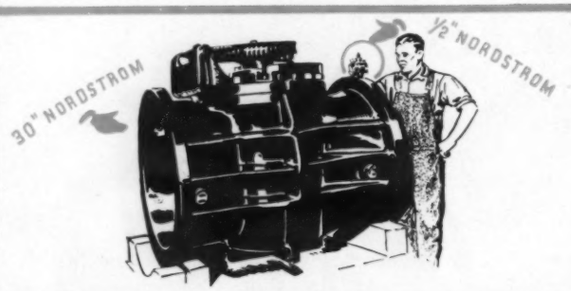
HIGH TEMPERATURES

In an inferno of heat, with temperatures as high as 600°, Nordstrom Valves hold the line tight. "Merco" lubricants have been developed for extra high temperatures under certain conditions, such as service in petroleum refineries where temperatures frequently range from 300° to 600°.



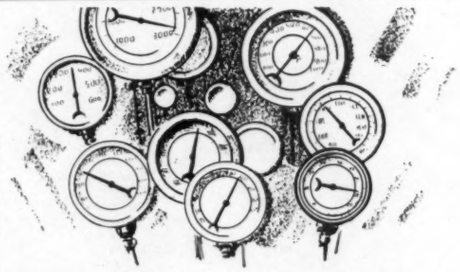
LOW TEMPERATURES

Nordstrom Valves can be subjected to extremely low temperatures. They are operating in plants where temperatures range to -60° Fahrenheit. The valves can always be opened or closed. The plug is protected with patented "Sealdport" lubrication.



UP TO MAMMOTH SIZE

The largest plug valves ever built have been Manufactured by Nordstrom. Shown is 30" Nordstrom in comparison with ½" size. Nordstrom features make possible plug valves of sizes formerly considered impracticable.



MULTITUDE OF PRESSURES

Every Nordstrom Valve is tested to twice its rated pressure. Made in ratings to meet all working pressures. Nordstrom Valves are successfully operating on lines carrying as high as 3000 lbs. gas pressure.

NORDSTROM *Lubricated* PLUG VALVES

For extreme services where valves must hold the line tight and successfully resist corrosion regardless of conditions, install Nordstroms.

Special alloy metals and scientifically developed "Merco" lubricants are available for unusual valve services.

MERCO NORDSTROM VALVE CO.

A Subsidiary of

PITTSBURGH EQUITABLE METER CC.

Main Offices: Pittsburgh, Penna. **Branch Offices:** New York City, Buffalo, Philadelphia, Columbia, Memphis, Atlanta, Chicago, Kansas City, Tulsa, Houston, Los Angeles and Oakland.

Made to Order FOR PUBLIC UTILITIES

The Barco Gasoline Hammer has ALL the requirements necessary for public utilities. Portable—no cumbersome auxiliaries—easily transported in service truck or pleasure car. Ample power for the heaviest concrete breaking. Performs any power hammer job—digging, driving test rods, asphalt cutting, rock drilling, sheeting driving, and back-fill tamping. One man operated—weighs but 89 pounds.

Operating and maintenance expense is so low that heavier equipment cannot compare with it in economy and savings.

THE BARCO MANUFACTURING COMPANY
1801 W. Winnemac Avenue, Chicago, Illinois

BARCO
PORTABLE GASoline HAMMER

THE ALL-YEAR MACHINE

Public Utility repair work has no respect for seasons — and neither does the Barco. Winter or summer, it will perform its job efficiently and economically.

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WESTERN GAS

"Reg. U. S. Pat. Off."

MEMBER AUDIT BUREAU OF CIRCULATIONS

Publication Office: 810 South Spring Street, Los Angeles, Calif.—Phone Michigan 1481
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JAY JENKINS, Publisher GEORGE H. FINLEY, Editor CRAIG ESPY, Mid-Western Manager
W. G. RUSSELL, Field Representative

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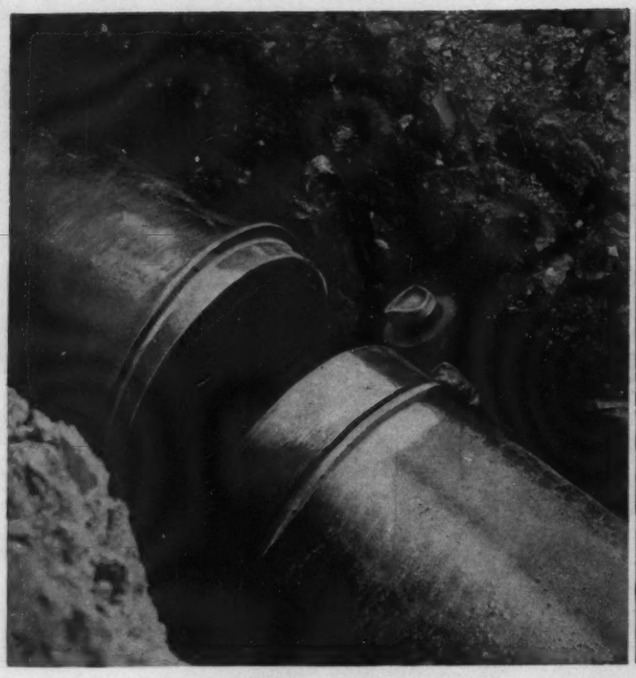
OFFICIAL PUBLICATION: Pacific Coast Gas Association; Southern California Meter Association

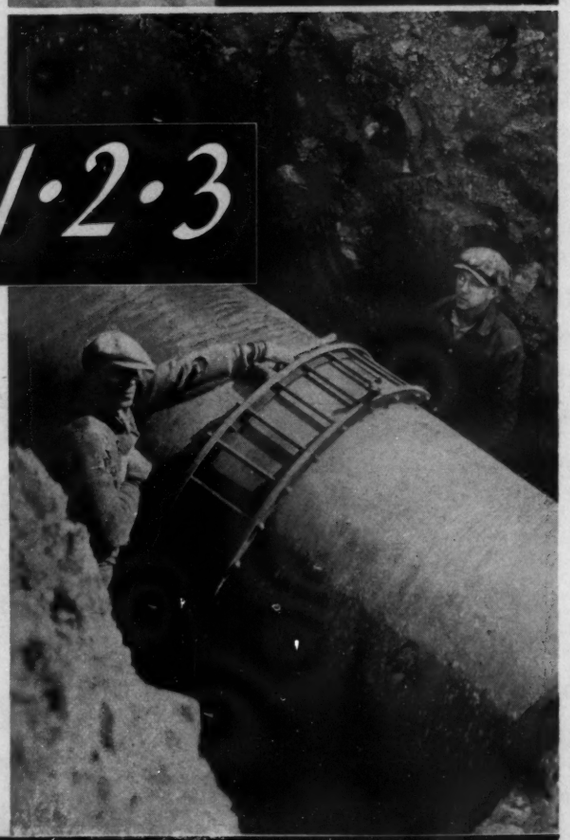
In its 100th year—*made of cast iron—the standard material for* gas distribution mains

● Photographic proof of the long life of cast iron gas mains—an exposed 6" cast iron main in Boston's gas distribution system, part of the original line laid in 1836, none of it ever replaced. Cast iron pipe as made today with gas-tight mechanical joints and with improved methods of metallurgical control is an even finer product for gas service than cast iron pipe made a century ago. The Cast Iron Pipe Research Association, Thos. F. Wolfe, Research Engineer, 1015 Peoples Gas Building, Chicago, Illinois.



No matter how large or how small... Joint–Making is as

Simple as 1·2·3



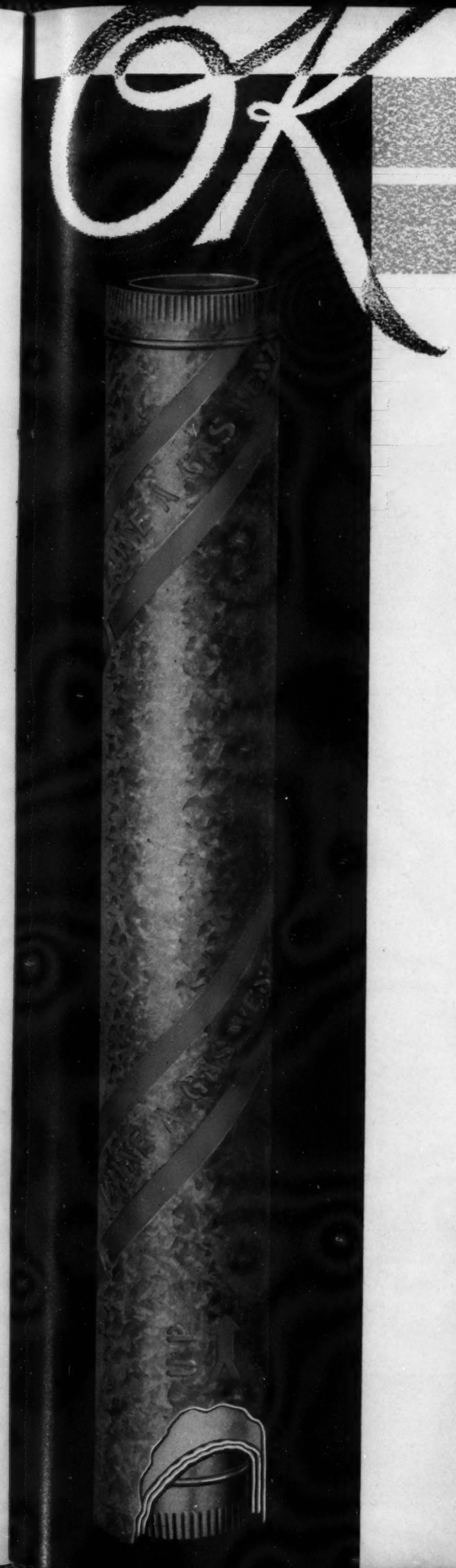
THREE pictures tell the story of Dresser simplicity. (1) Component parts of the Dresser joint —followers, gaskets, and middle ring—are slipped over plain ends of pipe. (2) Pipe ends are shoved into middle ring, and bolts inserted. (3) Bolts are tightened with ratchet wrenches, to compress gaskets between followers and middle ring.

Almost as easy as mounting a spare tire on a wheel! No lost motion. No special tools nor equipment. No skilled labor. The Dresser parts are ready to assemble—they fit correctly . . . go together in a jiffy. On 60" pipe or 3/8" pipe, there is no joint so easy to make . . . nor so permanently tight . . . as a Dresser Coupling. Engineers and contractors everywhere are enthusiastic over Dresser advantages. *Write for further information.*

S. R. DRESSER MANUFACTURING COMPANY
BRADFORD, PA.

In Canada: Dresser Mfg. Company, Ltd., 32 Front Street, West, Toronto, Ontario

with DRESSER COUPLINGS



PAYNE "A" GAS VENT

NON-CORROSIVE • • • INSULATING

● The Only metallic, insulated vent pipe for gas appliances which has been listed by the Underwriters' Laboratories as well as receiving the approvals of the Pacific Coast Building Officials Conference and the Building and Safety Departments of practically every city where such approval has been required or requested.

The 99% pure aluminum inner tube of Payne "A" Vent Pipe is non-corrosive. Products of combustion from natural or manufactured gas have no deteriorating effect on the superior grade of aluminum used in its manufacture. The inner tube heats rapidly—producing an immediate stack temperature.

Aircell asbestos insulation around this inner tube prevents cooling of products of combustion eliminating difficulties with condensate. The uniform stack temperature, combined with the insulation make this pipe extremely efficient, thereby producing the best possible results from the appliances so vented.

An outer casing of galvanized iron gives protection for the insulation against disintegration through exposure to moisture, as well as adding strength and durability to the features embodied in Payne "A" Vent.

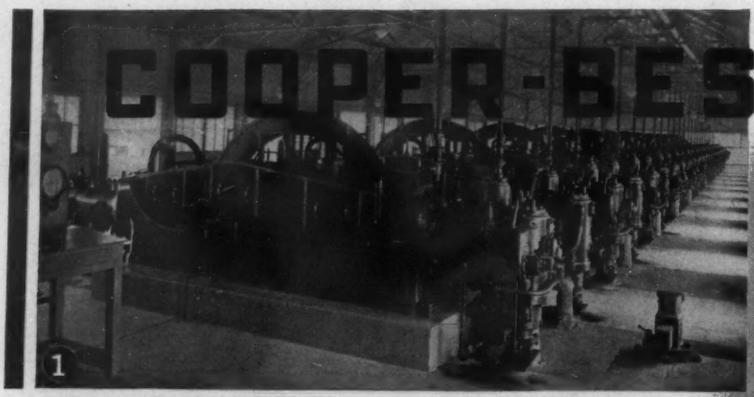
Payne "A" Gas Vent is distinguished from plain galvanized iron and other vent pipes by a spiral orange stripe for prompt identification. This marking is also being copyrighted for the protection of those interested in the proper venting of gas burning appliances.

PAYNE FURNACE & SUPPLY COMPANY

BEVERLY HILLS • • • CALIFORNIA

Proper installation assures complete combustion, efficient operation of gas appliance and carrying off of products of combustion.

COOPER-BESSEMER



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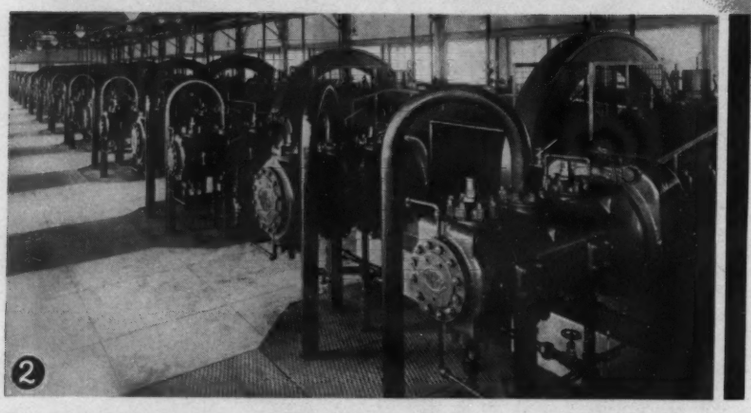

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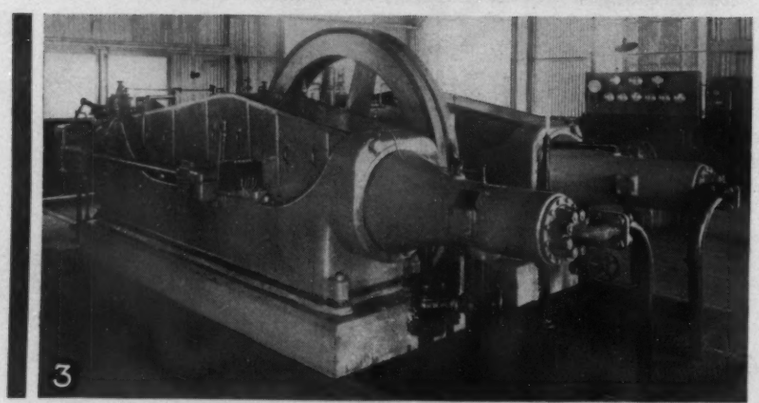

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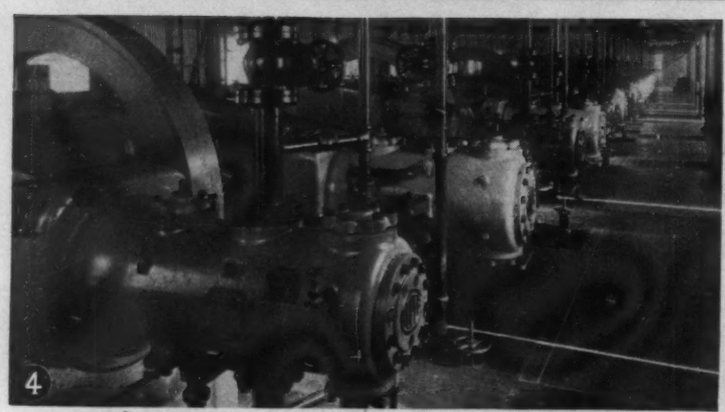


4

Keeps on Leading!

THE compressors shown in these pictures have been thoroughly time-tested by well known California producers. Their low operating costs are matters of record and they are just as efficient as when installed five and ten years ago. In most cases their investment costs have been written off — but they have ten, fifteen, even twenty years of profit producing life ahead of them.

Now without departing radically from these fundamental designs, Cooper-Bessemer is offering a more modern unit with more capacity per dollar invested. Ask the Cooper-Bessemer representative about the new Type-12. It is built to last a lifetime.

1 — Twelve Cooper-Bessemer Type-80 twin compressor units at General Petroleum Corporation's Santa Fe Springs plant.

2 — A duplicate of item (1), this plant is likewise used for gas lift and repressuring work.

3 — One of nine Type-80's at Continental Oil Company's Seal Beach repressuring and gas-lift plant.

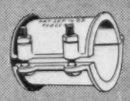
4 — Twenty-four Cooper-Bessemer Type-80 gas-lift units at Elwood, Calif., plant of Barnsdall Oil Company.

THE COOPER-BESSEMER CORPORATION

640 East 61st Street . . . . Los Angeles, California

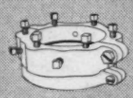
PLANTS — Mt. Vernon, Ohio — Grove City, Pennsylvania

SKINNER

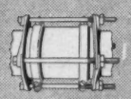


EMERGENCY PIPE CLAMP

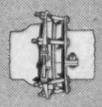
PIPE LINE CLAMP



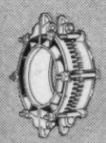
PIPE JOINT CLAMP



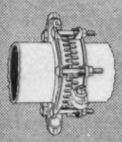
COLLAR LEAK CLAMP



BELL JOINT CLAMP



SPLIT COUPLING CLAMP



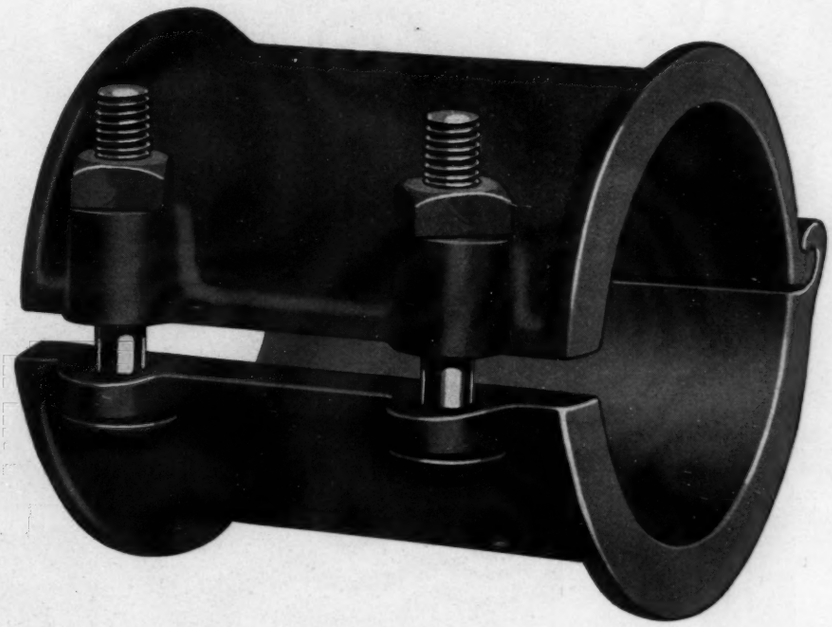
HIGH PRESSURE WELD CLAMP

SERVICE SADDLE

PRESSED STEEL ECONOMY CLAMP

A CLAMP FOR EVERY LEAK

EMERGENCY PIPE CLAMP



THE ORIGINAL PIPE REPAIR

★ 37 years ago Skinner introduced the Emergency Pipe Clamp, the first of a group of Skinner clamps now accepted as standard equipment in the oil and gas industry. Stops leaks in pipe lines instantly . . . put on in a minute by anyone . . . no pressure too high. Absolutely permanent. Saves: (1) cost of a new piece of pipe (2) the job of tearing out the old pipe and putting in the new (3) the expense and inconvenience of interrupting service. Note large bolts and raised lugs for wrench convenience.

Illustration at left shows a typical Emergency Pipe Clamp repair. Emergency Pipe Clamps are made of malleable iron, enamelled to resist rust, and equipped with cadmium plated steel bolts, and rubber gasket. Sizes for ½" to 12" steel or cast iron pipe.

Write for Catalog No. 35

M. B. SKINNER COMPANY

Manufacturers and Engineers • Est. 1898

SOUTH BEND • • INDIANA

PREFERENCE for FLUOR

is *definitely* established

The vast majority of engineers in the oil and gas industries who specify FLUOR, do so because they have genuine faith in the concern and confidence in the men within it.

Their preference, demonstrated time and again, is based on a knowledge that Fluor offers finest design, highest quality materials, expert workmanship and complete and competent service.

In a period of 45 years, Fluor products and Fluor engineering service, in all oil and gas industry divisions, have definitely established themselves by meeting the stiffest of all purchase requirements—that of complete satisfaction.

Fluor air-cooled mufflers installed in a California refinery.

A compressor station, Fluor engineered and constructed, for a California oil company.

FLUOR CORPORATION
•LTD•

909 East 59th St., Los Angeles, Calif.

909 McCormick Bldg. Chicago, Ill.
1406 Esperson Bldg. Houston, Texas
2342 State St. Alton, Ill.
719 McBirney Bldg. Tulsa, Okla.
220 W. 42nd St. New York, N. Y.

etting new and exclusive standards of performance

Republic Electric Weld Casing and Tubing have been setting new and exclusive standards of performance in every field where they have been used. • They are manufactured by a patented process of electrical resistance welding—a process that results in many advantages in the finished pipe, such as high yield point in the steel, perfect roundness, uniform wall thickness, freedom from scores, scratches, slivers and seams on the exterior surface, and also freedom from scale inside and outside. • This means uniform strength of wall and uniform thickness of metal under the threads, minimizing chances of failure due to collapse or pulling out at the joints. It means the utmost in dependability in every well where this better casing and tubing are used.

REPUBLIC
ELECTRIC WELD
CASING • TUBING

Republic Steel
CORPORATION
GENERAL OFFICES · · · YOUNGSTOWN, OHIO

REPUBLIC STEEL

Illustrations are of a reconditioned pipe line being treated with NO-OX-ID and wrapped with NO-OX-ID-IZED Wrapper. Work is now in progress on several hundred miles of line.

Reconditioning

Reconditioned pipe treated with NO-OX-ID twelve years ago is still functioning 100%. The balanced chemical and mechanical protection of NO-OX-ID pays big dividends in *extra* years of service.

With high resistance to soil stresses and to the penetration of moisture over a long period of time, NO-OX-ID and NO-OX-ID-IZED Wrapper in the correct combinations can cope with any corrosive conditions.

At a wide range of temperatures, the NO-OX-ID protective coat is applied easily and rapidly in a relatively thin film. The work "goes fast" and the comparatively small tonnage saves costs in freight and handling.

Let Dearborn, a house that specializes in the protection of underground pipe, submit recommendations and estimates for protection of your new and reconditioned pipe lines.

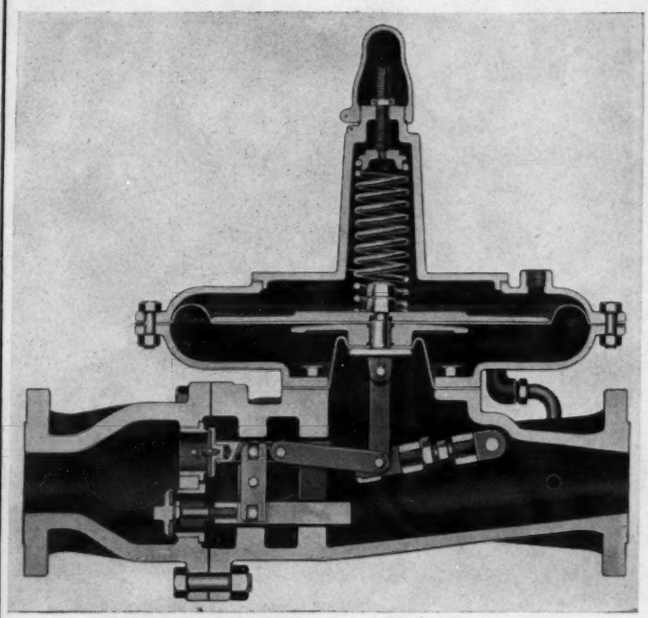
DEARBORN CHEMICAL COMPANY

Chicago **New York**

Los Angeles: 807 Mateo Street, Phone TRinity 3385
San Francisco: 421 Bryant Street, Phone SUtter 8688

NO-OX-ID
IRON-OX=RUST
TRADE MARK
The Original Rust Preventive

PERFORMANCE



ABOVE—Cross-sectional view of spring type, double valve, toggle type, flanged Regulator for industrial use, for pounds to pounds or pounds to inches W. C.

Reynolds' Products

High Pressure Service House Regulators
Straight Lever Type—Models 0-10-20 series
Toggle Lever Type—Model 30 series

Low Pressure Service or Appliance Regulators

District Station Regulators, Single or Double Valve
Auxiliary Bowl and Automatic Loading Device Optional

High Pressure Line Regulators
Pilot Loaded—Pilot Controlled

Toggle Type Regulators
Single Valve, Double Valve, Triple Outlet

Seals
Dead Weight or Mercury

Back Pressure Valves . Automatic Quick Closing Anti-Vacuum Valves . Automatic Shut Off Valves . Lever Operated Valves . Louver Operated Device . Atmospheric Regulators . Vacuum Regulators.

REYNOLDS Toggle Type Regulators for industrial gas control offer these features:

Removable valve pocket and orifices —side hand holes—streamlining that does not change direction of the flow of gas, increasing capacity and range —*pressure reduction from pounds to pounds and pounds to inches W. C.— single or double valve construction— spring or dead weight type adjustment and equipped with or without pilot control.

Regardless of how unusual or difficult the requirement, there is a REYNOLDS engineer ready to give you the correct answer. Many manufacturers who desire greater safety and accuracy on their products regularly consult with our engineering department. The same service is yours for the asking—write.

*Body of Regulator is so machined that a pounds to pounds diaphragm casing or a pounds to inches W. C. diaphragm casing may be used or interchanged.

REYNOLDS GAS REGULATOR CO.
ANDERSON . INDIANA.

No. 2 of a Series

Reprinted from "In Gear"—the Pacific Gas and Electric Company's plan for united industry cooperation during 1935.

P·G

APPLIANC

SYSTEMATIC collection of data on appliances in use was inaugurated by this Company in 1934.

A complete survey of the field was planned. The purpose was to obtain full information regarding appliances in use so that sales campaigns might be more intelligently planned, future business more accurately estimated and immediate prospects more thoroughly listed.

First designed to cover only domestic customers, the plan was extended to include all consumers—domestic, agricultural, commercial, and industrial.

Each of the Company's salesmen is required to complete a stipulated number of surveys each week, using standard forms of inventory report, which show the appliances or equipment in use, whether they are in good or fair condition or are so old or worn out as to be ready for replacement, and finally the competitive fuels utilized by the customer.

The result of the survey is the progressive accumulation of data,

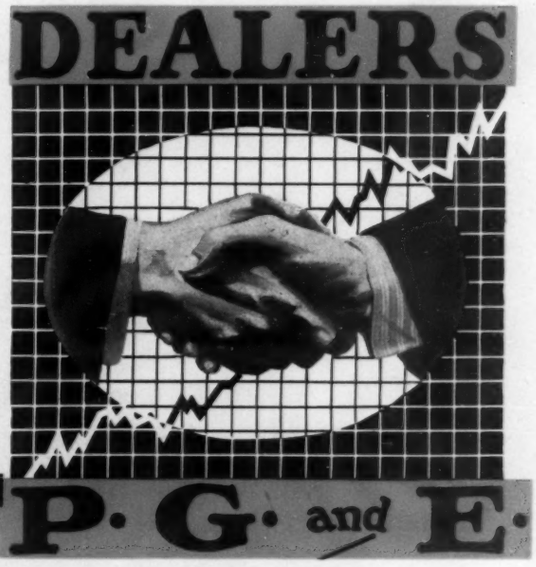
P. G. and E.

E SURVEY!

which, when completed, will cover the entire territory. Approximately 160,000 reports were filed in 1934. The work is being prosecuted during the current year.

Benefits of the appliance survey are immediate and continuous. It provides a source of prospect data which are allocated to dealers in accordance with the Company's rules for equitable division of potential business between dealers.

Dealers: Information regarding the use of this appliance inventory may be obtained through our local office.



PACIFIC GAS AND ELECTRIC CO.

{Owned · Operated · Managed by Californians}

WM. MOELLER, JR., Pacific Coast Gas Association chief, will call the organization's membership into annual session at Pasadena, Calif., on September 17. Mr. Moeller is vice-president of the Southern California Gas Co., Los Angeles, in charge of gas production and transmission.

September, 1935

WESTERN GAS

"Reg.U. S. Pat. Off."

Vol. XI, No. 9

LOS ANGELES—810 South Spring Street . . . . . 1064 Peoples Gas Building—CHICAGO

CONVENTION FOREWORD

THE 42nd Annual Convention of the Pacific Coast Gas Association will be called to order at 10:30 on the morning of September 17 at the Huntington Hotel, Pasadena, California.

During this Convention, the members of the gas industry in the Pacific Coast area will freely discuss the most important problems of the industry; will exchange individual ideas and thoughts; will renew old friendships and will make new ones.

Some one has said that the trade association convention is a phenomenon peculiar to America. Perhaps it would be better to say that a conference at which the desires of the majority can be ascertained after full and free discussion is a prerogative and privilege to be had only in a democracy. Conventions have become an important factor in our business life and business management because they are useful in maintaining the equilibrium of our business structure. Conventions of well organized associations serve their industry as Congress should serve the Nation, and, in addition, they provide a forum for the dissemination of information and for the education and training of the industry's younger men.

It is of value to have all people within an industry acquainted with each other, and it acts as a stabilizer. While it is true that conventions should have a serious purpose, it is also true that the friendship and personal contacts between competitors, which is one of the purposes, are frequently better built up during playtime than in the Convention assembly. A well planned convention should offer opportunity for both serious discussion and for genial relationships.

Our conventions are perhaps more serious now than they were some years ago, but this is only because the industry has more serious problems to discuss. We still believe in good fellowship and our 42nd Annual Convention has been planned to stimulate and develop both serious discussion and good fellowship.

THE Nation is now coming out of a severe depression which has created many problems for the gas industry. The rebuilding of business is presenting many more problems. A great deal of thought has been given to presenting these problems as a part of the convention program. For some of them we have answers and for others we have not, but their presentation and discussion by well informed men and women will bring the unanswered ones closer to solution. Your participation in this Convention will help you and it will help the industry.

WM. MOELLER, JR.
President,
Pacific Coast Gas Association.

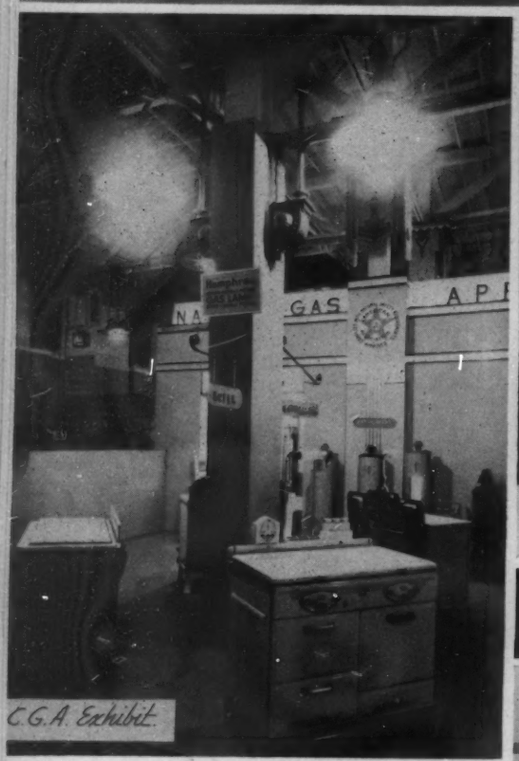
GAS DAY

SATURDAY

● HEIGH, HO, Come to the Fair! Only in this case the Fair is America's Exposition at San Diego, and the occasion is Gas Appliances Day, September 21, set apart by the Exposition management in honor of visiting delegates from the Pacific Coast Gas Association's 42nd Annual Convention. Concluding the convention sessions proper at the annual banquet Thursday evening, September 19, many P. C. G. A. members will make the short trip from Pasadena to San Diego on Friday and be on the Exposition grounds on the 21st.

Ray C. Cavell of the San Diego Consolidated Gas and Electric Co. is in charge of the Convention's Exposition trip feature. Transportation for those who desire it will be arranged from Huntington Hotel headquarters. The Association's own exhibit will be the rallying point for gas industry visitors on Friday and Saturday. The principal event on Gas Appliance Day will be a show-

...a Company Exhibit.



C.G.A. Exhibit.

Casa de Tempo (all-Gas Home)

Two Sections of Gas Company Exhibit

"Zorene", Exposition Nudista Colony Queen, likes her food gas-fired.

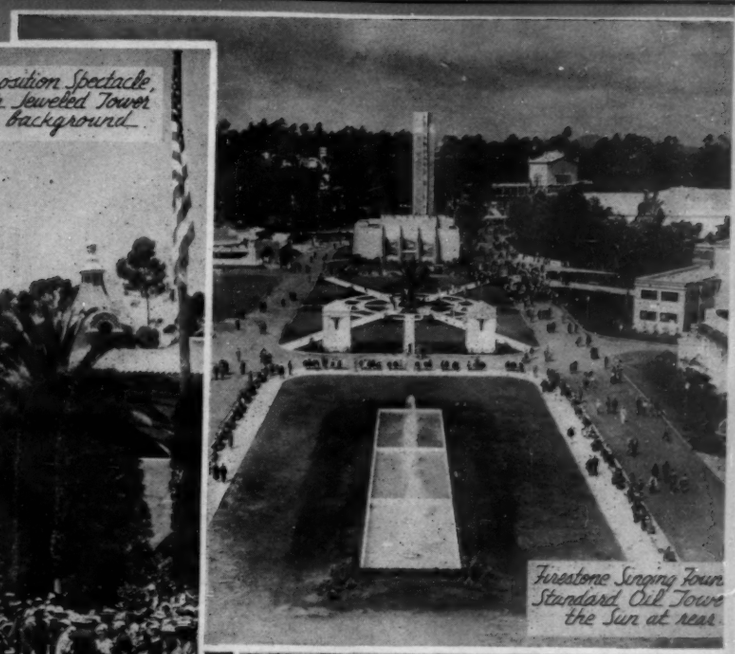
at the Exposition

SEPTEMBER 21

ing of The Modern School of Gas Cookery, arrangements for which are in charge of A. T. Gray, Los Angeles Gas and Electric Corp., with the local co-operation of Forrest M. Raymond of San Diego Consolidated. From 7:30 to 9:30 p.m. Miss Victoria Warner, home service director for L. A. G. and E., and her entire staff, will conduct a lecture demonstration of unusual popular appeal. Special door prizes and some unique advance publicity are expected to bring Exposition crowds in good number to Ford Bowl, which has been secured by arrangement with Ford officials. The nightly musical attraction staged at Ford Bowl is being cancelled in favor of The Modern School of Gas Cookery.

● Among the exhibits that of San Diego Consolidated Gas and Electric Co. and Southern Counties Gas Co., and that of the P.C.G.A., both located in the Palace of Better Housing, will be special attractions to gas men.

Exposition Spectacle, with Jeweled Tower at background.

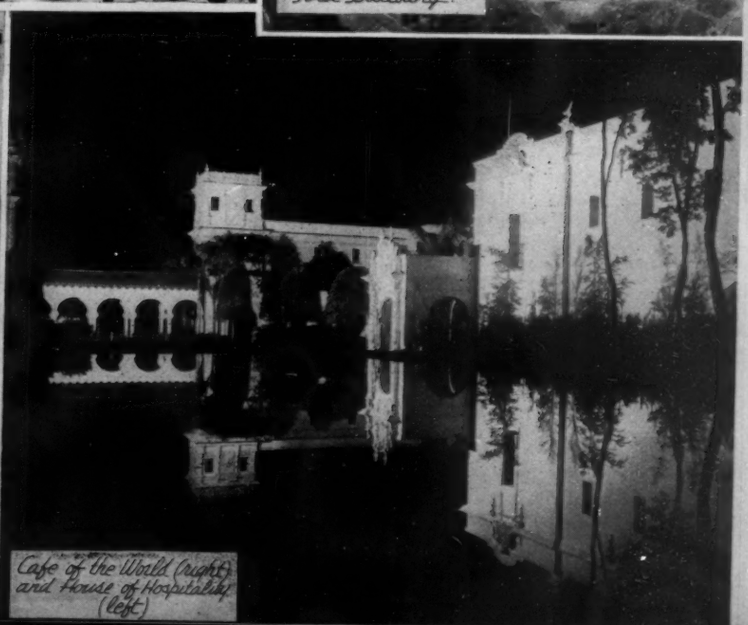


Firestone Singing Tower, Standard Oil Tower, the Sun at rear.

Crowds at the Midway

Exposition Over-all, with close-up of Ford Building.

Avenue of Palaces



Cafe of the World (right) and House of Hospitality (left)

J. M. BOURUS, Accounting — FRANK TALCOTT, Commercial — EL ROY PAYNE, Manufacturers — R. R. BLACKBURN, Public Relations — J. S. SPAULDING, Advertising — A. R. BAILEY, Technical

THESE GENERAL CHAIRMEN OF P. C. G. A. SECTIONS WILL PRESIDE AT CONVENTION PARALLEL SESSIONS

42nd Convention Calls West Coast Industry to Pasadena

THE strongest possible incentive for a large attendance at the Pacific Coast Gas Association's 42nd Annual Convention, dated for September 17-20 at the Huntington Hotel in Pasadena, is the program which appears in the following pages. As is always the case, P.C.G.A. officers, committees, and headquarters' staff have combined efforts to produce a splendid educational offering in the business portion of the convention.

A number of the papers and reports to appear on the program are found in this issue of *Western Gas* (beginning on Page 21), and it is hoped that the advance reading given them will add materially to the value of convention discussions.

President Wm. Moeller, Jr., will officially open the convention at 10:30 A.M., Tuesday, September 17, when the first of several general sessions comes to order. Tuesday will be given over to general sessions, as will also the morning meetings of the two days following, while parallel sessions of the several sections will take place on Wednesday and Thursday afternoons.

Business sessions will extend through September 19, the annual banquet and dinner dance being scheduled for that evening. On September 20 will come the annual golf tournament at the Annandale Country Club.

The 42nd Annual Convention will conclude on the grounds of the California Pacific International Exposition at San Diego, on September 21, which has been designated as Gas Appliances Day by the Exposition management. Creditable gas exhibits of the Association, member gas companies, and individual manufacturers, as well as special attractions planned to interest gas industry delegates at the Exposition on September 21, are expected to bring a good portion of the convention attendance on to San Diego. Pages 16 and 17 give more complete information on the Exposition feature of the convention.

In direct charge of arrangements for the convention is an efficient committee made up of the following: Geo. S. Campbell, General Chairman; Wm. Maddock, Program Chairman; O. L. Moore, Entertainment; O. F. Adkins, Transportation; Geo. M. Sadler, Banquet; Clyde H. Potter, Hotel Accommodations; W. M. Henderson, Reception and Attendance; W. M. Thompson, Golf; Otto Mauthe, Publicity; Wm. Fisher, Registration; Ray C. Cavell, San Diego Exposition Trip; Mrs. Wm. Moeller, Jr., Hostess.

GENERAL SESSIONS

TUESDAY . . 10:30 A.M.

A Greeting from Southern California—Miss Marion Parks, Secretary, Historical Society of Southern California.

Welcome to Pasadena—Addison B. Day, President, Los Angeles Gas and Electric Corp.

President's Address—Wm. Moeller, Jr., President, Pacific Coast Gas Association.

Election of Officers.

Amendment of By-Laws.

Gaining the Confidence of the Public—L. B. Denning, President, Lone Star Gas Co., and Vice-President, American Gas Association.

In Memoriam.

TUESDAY . . 2:00 P.M.

Promotional Activities of Pacific Coast Gas Companies—Frank Talcott, General Chairman Commercial Section.

National Program of Business Promotion—Capt. A. E. Higgins, Secretary Natural Gas Department, American Gas Association.

Markets for Gas—Old and New—Eugene D. Milener, Research Engineer, American Gas Association.

Let's Go to Work—Ray U. Brouillet, Ray Brouillet & Associates, San Francisco.

TUESDAY . . 8:00 P.M.

UTILIZATION CONFERENCE

Report: Life of Water Heaters—C. A. Renz, Los Angeles Gas and Electric Corp., Chairman.

Characteristics of Natural Gas Flames—Everett D. Howe, Assistant Professor, Mechanical Engineering, and A. S. Leonard, P.C.G.A. Fellow, University of California.

Report: Field Equipment and Training of Service Men—R. C. Terradell, Los Angeles Gas and Electric Corp., Chairman.

Report: Gas Appliance Installation Standards—Frank Wills, Pacific Gas and Electric Co., Chairman.

WEDNESDAY . . 9:30 A.M.

(Presiding—R. R. Blackburn, General Chairman, Public Relations Section.)

Education and Training of Utility Employees—Guy Wadsworth, Personnel Director Southern Counties Gas Co.

Personalizing Customer Contacts—E. W. Ellis, Assistant Secretary Southern California Gas Co.
(1) Application for Service; (2) Credit Ratings and Deposits; (3) Customer's Bills; (4) Customer's Complaints.

WEDNESDAY . . 8:00 P.M.

(Under Auspices of Public Relations Section)

Opening Remarks—R. R. Blackburn, General Chairman, Public Relations Section.

A program of talking pictures made by gas companies to assist in sales, in employee training, and to inform customers of the means by which the company renders them service. (Motion picture equipment exhibit courtesy of Eastman Kodak Stores.)

THURSDAY . . 9:30 A.M.

Wooing the Consumer's Dollar—T. N. Carver, Professor Emeritus, Harvard University.

The Effect of Social Security Legislation upon the National Economy in General and the Public Utility Business in Particular. Lawrence G. Hanmer, Manager Pension Department Johnson & Higgins of California.

(There will be other well qualified speakers on this program who will discuss important topics of the day).

ACCOUNTING SECTION

WEDNESDAY . . 2:00 P.M.

Address of Chairman—J. M. Bourus, General Auditor, San Diego Consolidated Gas and Electric Co.

Discussion of Reports:

Centralized vs. Decentralized Customers Accounting—F. C. Ingram, Southern California Gas Co., Chairman.

Customers Credit Rating—George A. Porter, Southern California Gas Co., Chairman.

Collection Practices—Morris F. Wales, Los Angeles Gas and Electric Corp., Chairman.

Reading, Billing and Collecting At One Time—Geo. C. Schiesberg, Southern Counties Gas Co., Chairman.

Mechanical Office Equipment—Lester E. Green, Los Angeles Gas and Electric Corp., Chairman.

THURSDAY . . 2:00 P.M.

Informal Discussion of Accounting Practice in Connection with 1935 Tax Measures.

COMMERCIAL SECTION

WEDNESDAY . . 2:00 P.M.

Address of Chairman—Frank Talcott, Division Sales Manager, Pacific Gas and Electric Co.

Report of Domestic Sales Committee—W. M. Jacobs, Chairman, Southern California Gas Co.

The "Why" of Home Service—Gladys Price, Home Service Director, Southern California Gas Co.

Helping Dealers Help Themselves Through Advertising—J. S. Spaulding, Advertising Manager, Los Angeles Gas and Electric Corp.

Open Discussion on Domestic Sales Problems.

THURSDAY . . 2:00 P.M.

Report of Industrial Sales Committee—R. L. Grutzmacher, Chairman, Natural Gas Equipment, Inc.

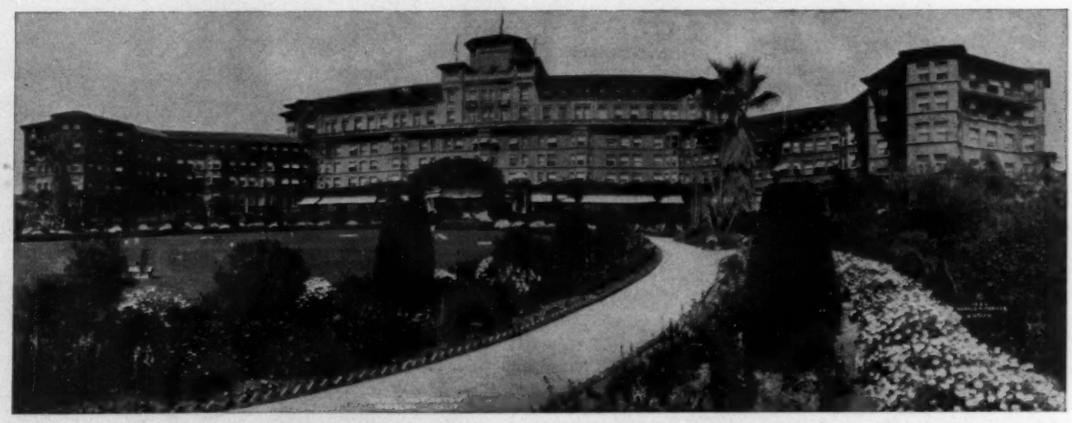
Review of Committee Reports.

Symposium of Cooperation Between the Sales and Service Departments.

MANUFACTURERS SECTION

THURSDAY . . 2:00 P.M.

Address of Chairman—E. L. Payne, General Chairman, Payne Furnace & Supply Co.



Panorama of spacious Huntington Hotel, headquarters for P.C.G.A. Pasadena convention.

Experience with Cooperative Exhibitions—The Los Angeles Better Housing Show—J. E. Kern, Southern California Gas Co.
The San Diego Exposition—C. H. Potter, Southern Counties Gas Co.

A.G.A. Laboratory Research and Requirements—F. E. Vandaveer, Supervisor, Los Angeles Laboratory A.G.A.

Election of Officers.

Discussion of Future Program of Section—Led by A. F. Rice, Sales Manager, H. R. Basford Co.

TECHNICAL SECTION

WEDNESDAY . . 2:00 P.M.

Address of Chairman—A. R. Bailey, Division Superintendent, Coast Counties Gas and Electric Co.

REPORTS OF NATURAL GAS TRANSMISSION COMMITTEE

P. E. Beckman, Chairman, Pacific Gas and Electric Company.

Soil Corrosion—A. B. Allyne, Southern Counties Gas Co., Chairman.

Internal Corrosion and Dehydration—F. A. Hough, Southern Counties Gas Co., Chairman.

Compressor Plants—Grove Lawrence, Southern California Gas Co., Chairman.

Orifice Meter Standards—F. A. Hough, Southern Counties Gas Co., Chairman.

Heating Value of Natural Gas—Guy Corfield, Los Angeles Gas and Electric Corp., Chairman.

THURSDAY . . 2:00 P.M.

REPORT OF PRODUCTION COMMITTEE

J. F. Sauer, Chairman, Pacific Gas and Electric Co.

REPORT OF DISTRIBUTION COMMITTEE

N. L. Hoff, Chairman, Los Angeles Gas and Electric Corp.

Distribution Valve and Governor Inspection—E. G. Campbell, Pacific Gas and Electric Co., Chairman.

Effect of Humidity on Meter Proof—Guy Corfield, Los Angeles Gas and Electric Corp., Chairman.

Optimum Odorant Concentration—M. T. Burton, Southern California Gas Co., Chairman.

Safe Gas Distribution Practice—C. A. Renz, Los Angeles Gas and Electric Corp., Chairman.

Devices and Contrivances—Otto Goldkamp, San Diego Consolidated Gas and Electric Co., Chairman.

Illustrated Talk—A Means to an End, W. M. Henderson, Superintendent of Distribution, Los Angeles Gas and Electric Corp.

WOMEN'S COMMITTEE

Katherine L. Rathbone, Southern Counties Gas Co., Chairman.

WEDNESDAY, 12:15 P.M.—General Get-together Luncheon of Public Utility Women.

WEDNESDAY, 3:00 P.M.—Women's Committee Conference.

LADIES PROGRAM

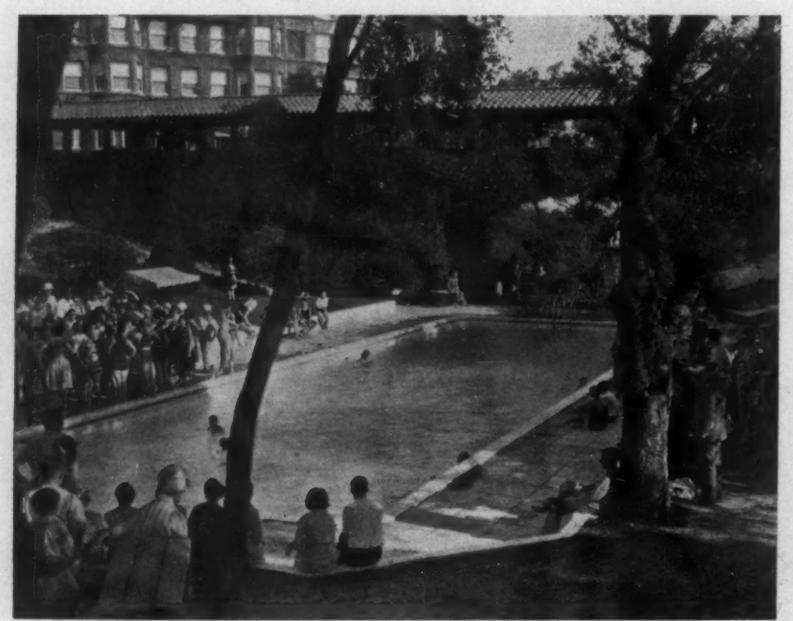
TUESDAY, 4:00 P.M.—Tea given in honor of visiting ladies by Mrs. Wm. Moeller, Jr.

WEDNESDAY, 12:30 P.M.—Luncheon-bridge at Huntington Pool.

THURSDAY, 10:00 A.M.—Motor trip about Pasadena with visits to points of particular interest.

2:00 P.M.—Visit to Huntington Library and Art Gallery.

7:00 P.M.—Annual Banquet.



Huntington Hotel's beautiful pool.

PACIFIC COAST GAS ASSOCIATION

Presenting a number of reports and papers from Accounting, Commercial and Technical Sections, prepared for the 42nd Annual Convention

Reading, Billing and Collecting at One Time

By GEO. C. SCHIESBERG
Southern Counties Gas Company of California

THE practice of reading, billing and collecting at one time is one that has been given very little thought and consideration by public utilities, except in a few cases.

One Pacific Coast company has approximately one-half of 1 per cent of its accounts (about 400) which are read, billed and collected at the same time. These accounts consist principally of restaurants, picture houses and new businesses that have not established credit, or are unable to advance adequate security on the account. These accounts are weekly, semi-monthly and monthly. The collector under this practice is able to read, bill and collect approximately 20 accounts per day; few errors are made and no complaints are received from consumers on this method. While the expense is a little more in handling the account for this type of customer than it would be in regular routine, the added expense is more than offset by the reduction in bad debt losses, and the securing of business that might otherwise be lost.

Geo. C. Schiesberg

Another company has two districts where all weekly accounts are read, billed and collected at one time. One of the districts has approximately 130 such accounts. One city in this district has about 55 such accounts which require one whole day's time for one collector to complete. The balance of 75 accounts is scattered over seven other cities in the district and requires only part of a day for collectors in that particular neighborhood to complete. The weekly readings are made on a cumulative basis; i.e., the first week is figured on the straight monthly rate; the second week is figured on the monthly rate for two weeks, less previous week's billing; and the third week figured on the monthly rate for three weeks, less previous two weeks' billing; and the fourth week on the same basis. In addition to this a further check is made from time to time by the regular meter reader in order to compare the correctness of previous reads.

All bills are addressographed in order of the reading schedule in the meter book, and all previous readings, as well as any unpaid balances, are entered on consumers' bills by the bookkeeping department, before the collector starts on his route. Very few errors are made by the collectors.

The other district has approximately 80 weekly accounts which are read, billed and collected at one time. These accounts are located in seven cities in the district. Practically the same method is used as in the district previously mentioned, except they do not read, bill and collect at one time on the last week of the month, but instead, only read the meters; the fourth or final bill is made up by the bookkeeping department in order that adjustments, if any, can be made at that time. The bills are then taken out by the collector for collection.

The accounts are divided into three areas, with a collector for each area. In one area, the collector covers 34 such accounts in about 1½ hours; in another the collector covers 17 accounts in two hours and in the third the collector requires three hours to take care of 29 accounts. All of the 80 accounts in this district are located in inland cities.

It can readily be seen that there is no check on the collectors as to the monetary amount of bills, for the reason that the amount is not known by the bookkeeping department in advance, and a collector can take advantage by manipulating some of the accounts, if he is inclined to be dishonest.

No cost data have been kept relative to the method of reading weekly accounts; billing them in the office, and later sending the bills out by a collector for collection; as compared with the method used by companies in reading, billing and collecting at one time. However, it is very evident from the number of accounts a collector is able to take care of daily under the latter plan that the cost would be considerably more than the present method.

Another method of handling weekly accounts is used by the same company in a beach district. This district has at the present time approximately 350 accounts that are billed weekly. Some 70 per cent of these are in three beach cities. A large percentage of the accounts are concessions, restaurants and hamburger stands, and most of them do not open until after 2 p.m.

It requires 17 hours to read all meters throughout the district. The meters are read on Saturday forenoon, billed by the bookkeeping department on Monday and given to a collector on Teusday; 88 per cent of these bills are collected upon presentation by the collector, the balance of 12 per cent being paid by the end of the same week. Most of the accounts carry a cash deposit of twice the amount of the average weekly bill.

When a consumer calls at the office to sign for gas for these classes of businesses and is unable to advance a deposit of twice the amount of a monthly bill, he has the option of making a small deposit and being placed on the weekly basis.

The procedure of reading the meter, and the date the collector calls to present the bill are thoroughly explained to the consumer by the counter clerk. In this manner he knows just what day his bill is due.

In case the consumer is not in at the time collector calls, a 48-hour notice is left and collector calls again. However we find very few accounts upon which it is necessary to call the second time.

Under this method the bills are checked out to the collector on the regular form "Collector's Daily Report", showing the account number and the amount of the bill. When the collector turns in his collection report for the day, he must either turn in cash or, in case no collection has been made, return a copy of the bill left with the consumer. The result is that there is a check on the collector of the bills he was charged with for the day's collection.

Having outlined the procedure used in reading, billing and collecting at one time by the few companies using that method, there remains another procedure used by one company in handling weekly accounts, which differs somewhat from the practice used by the other companies.

This company has some 650 weekly accounts. Its weekly accounts have grown considerably in the past two years, as well as the expense of handling them. In order to keep the expense at a minimum, a plan of billing this class of consumer on an estimated weekly basis was adopted a short time ago.

Billing the consumer on an estimated weekly basis has eliminated the necessity of reading the meters weekly, and a considerable amount of bookkeeping. The meters are read once a month and billed; credit is given on the bill for the amount of the three weekly payments made on the estimated bill; the collector then calls to collect the difference or credit it to the consumer's account as the case may be.

Before this plan was put into effect, it was necessary to obtain the consent of the Railroad Commission, which was granted, and the consumer must also consent to allow the company to carry his account under this plan. A special application for this type of pro-

cedure is signed by the consumer, after it has been explained to him and meets with his approval.

This procedure has been found to be very effective and has proven entirely satisfactory to consumers.

Conclusion

To sum up, the practice of reading, billing and collecting at one time, does not eliminate the work of the bookkeeping department. Postings must still be made weekly to the accounts. Furthermore, the bookkeeping department has no actual control of the billing, but instead, the billing is controlled by the collectors.

In the final analysis, there appears to be better control of accounts and collections in using the procedure adopted by most utilities; i.e., reading; billing at the office; and sending bills out for collection.

Procedure for Distribution Valve and Governor Inspections*

ALL of the gas utilities on the Pacific Coast are making inspections and servicing their valves and governors to some extent. There is one company in particular that has a very elaborate system for handling this class of work. Others use various methods which are very good and are suitable for their individual purposes.

The function of this committee is to select the best parts from the various systems now in use and incorporate them into a procedure that could be used as a standard practice by all companies. Such a procedure would be of material benefit to all of us as it would be uniform and we would be in a position to make cost comparisons between the various companies.

E. G. Campbell

Inspection Records

An integral part of this procedure is the recording of the actual amount of servicing done on valves, governors and dust filters, and is important information that the distribution man should have at his finger tips, in that, close observation of these records will enable one to determine the location of governors that need servicing more often than others, and why. Also what sections are most troubled with dust and how often the filters should be inspected and cleaned. For this data, we suggest the use of 6- x 4-inch cards with appropriate headings which call for certain necessary information. The samples may be seen in Figs. 1, 2 and 3. These cards are to be used as a permanent office record.

We have all been somewhat careless with regard to servicing our distribution main valves; especially those that could be used in an emergency to control pressures or isolated districts or portions of a distributing system. Most of us felt nothing would ever happen so why should we increase our maintenance costs. Nevertheless, we have been rudely awakened by recent earthquakes and other catastrophes over the country to the necessity of keeping all such valves in good working condition. The cost of servicing and inspection is negligible in comparison with the benefit that would be derived in case of a disaster.

Curb Valves

There seems to be some question in the minds of distribution men as to the advisability of servicing curb valves (valves on services to consumers' premises). The necessity of some periodic inspection is obvious if we consider the experience of one large company which has just started inspecting and servicing this type of valve. It found on the older installations approximately 25 per cent of the valves to be inoperative in that they could not be moved by hand and only with difficulty could they be turned by the use of a special extension fork. Others were frozen tight due to corrosion or packing in the stuffing box being too tight around the stem. Many others were completely covered with dirt or mud which found its way into the valve box through finger holes in the cement cover.

The problem of putting the frozen valves into operating condition without a shut-down or inconvenience to the consumer can be overcome by forcing penetrating oil through the stuffing box onto the lower valve stem and gate. To accomplish this, it is necessary to use extension wrenches, a tool to remove packing, an adapter with a "Zerk" fitting to fit over valve stem, and a special "Alemite" gun.

It is the writer's opinion that some inspection should be made, especially in congested and business districts or in districts where fire traps are known to exist. There are no recommendations as to the frequency of inspection but it would seem most economical to make it in conjunction with the regular leakage survey of man holes, water valve boxes, etc., that are adjacent to our services.

The only work involved to find out if the valve is in operating condition is to first see that it is fully open, then turn two or three full turns towards the closed position. If it moves freely there is no further work to be done. If, on the other hand, it is found to be frozen, it should be turned over to a servicing crew for attention.

Inspection of Governors and Dust Filters

The periodic inspection of governors and dust filters is of extreme importance if close regulation and control are desired. All of the larger companies are agreed that this inspection is necessary although the length of time between the servicing varies somewhat with the different systems. Two of the larger companies of the Pacific Coast are both of the opinion that the work is important enough to warrant inspection at least once a month as a matter of routine. Most companies have gauge installations at each vault from which daily charts are taken. In the interim between inspections, should there be a drop or increase in pressure, it would be readily noted and would be an indication to the person in charge that the governor was not properly functioning or the dust filter was being clogged.

The frequency of inspections of dust filters depends on local conditions such as peak loads and high gas velocities in certain areas and may vary from one day to three months.

In the routine inspections, a regular crew should be assigned to the work. They should be held responsible for the correct functioning of all governors under their supervision. Upon arrival at the vault, barricades are erected around the vault opening. A standard methane lamp or other approved gas detector is lowered into the vault to determine the presence of gas. After the vault has been found to be safe to enter, the men may perform their duties. Usually a crew of three men is sufficient. Two men can work below—the third man to stay on the street level to render any assistance that may be required.

Inspections should consist of the following operations:

Test governor for lock-up.
Check conditions of diaphragm and test for leakage.
Test diaphragm vents to prevent clogging.
Remove all rust; clean, oil and grease moving parts.
Tighten stuffing boxes—repack if necessary.
Test entire governor set for leaks if gas odor is apparent.
Inspect dust filter; clean muslin and screen and remove dirt from pot.
Clean and repaint all metal surfaces if corrosive action is noted.
Test gauges on high and low side of governor for accuracy.
Remove all water and dirt from vault sump.
Brush down walls and sweep floor.
Note condition of manhole cover, also street paving around vault.

After it is apparent that the governor is not operating correctly and will not lock up, it should be replaced and sent to the shop for complete overhauling or be overhauled in the field, depending of course on the practice now in use.

GOVERNOR AND VAULT RECORD

LOCATION _____

MAKE _____ SIZE _____ TYPE _____ CO. NO. _____ DATE INSTALLED _____

DATE	TIME COMPLETED	VAULT						GOVERNOR											NOTE: Mark all work done with "X"
		VAULT OK	PAINTED	VALVES LUBRICATED	CONDITION OF PIPING	VENT OK	GAUGES OK	GOVERNOR OK	NEW DIAPHRAGM	DIAPHRAGM ASSEMBLY	REPACKED STUFFING BOX	NEW SEATS	TEST FOR LOCK-UP	FILLET SCREWS	OUTLET PRESSURE	WORK DONE IN FIELD	WORK DONE IN SHOP	WORKMAN'S NAME

FIG 1.

*Committee Report: E. G. Campbell, Chairman, P. G. & E. Co.; V. W. Harper, Portland Gas & Coke Co.; E. Henderson, So. Calif. Gas Co.; V. J. Robbins, L. A. G. & E. Corp.

FILTER RECORD

METER SET / MAIN

LOCATION_____

MAKE SIZE TYPE NO. DATE INSTALLED

| | | |

passed through the machine at a given rate, based on the capacity of the device under test and governed by a set orifice giving us a constant dust concentration for the period of our test. The differential across the device under test is recorded with a differential draft gauge showing the pressure drop as the dust builds up on the filtering medium. Also, this gauge is a check on the device to show channeling. At the conclusion of the test the dust left in the machine is weighed and the positive filter which catches all dust passing through the device under test, is weighed. From these weights, the known metered quantity of gas, and the known dust concentration, the rating of the device can readily be computed. This rating is based upon the following points:

1. Dust arrestance per volume of gas per unit of presentation area to which the device is best adapted. This will be governed by the resistance to gas flow and by the ability of the device to arrest and retain dust.

2. Resistance to gas flow will be governed by the amount of gas passed through the device and by its ability at this velocity to maintain a high arrestance of dust. The resistance to gas flow of a non-automatic gas cleaning device, and probably the resistance of all gas cleaning devices, changes constantly from the moment of the beginning of dust arrestance to the moment when the device becomes either clogged or breaks away, such as channeling in hair filters. Such devices should be rated at the conditions of volume, resistance and arrestance in effect when the resistance is half way between its dustless minimum and its dustiest maximum.

3. Arrestance of dust will be established by the average conditions in effect when a uniform volume of gas is being handled over the entire useful life of the device, this useful life being limited by the resistance to gas flow.

Thus a gas cleaning device might be rated at 100 cu. ft. per 25 square inches area of felt, or 4 cu. ft. per square inch area; resistance 0.01 inches of water clean, 0.46 inches of water end 10 hours.

Arrestance average during test period of 10 hours, 94 per cent.

This is obtained by the following formula:

$$\text{Arrestance} = 1 - \frac{D_1}{D_2} \text{ in which}$$

D_1 is the dust caught by the positive filter and

D_2 is the total dust sent out by the dust machine.

Performance Characteristics of the Various Types

A survey of the market of all gas cleaning devices was made and the different types and makes studied. Of these various types, the best of each class was tested and rated. Apparently, the perfect gas cleaner has not been invented. Nearly all of those on the market have at least one point of excellence, though in some cases that point may be of minor importance. It is hoped that the following general discussion of types and their more important characteristics may enable the industry to judge with a fair degree of accuracy how closely any given gas cleaner approximates the ideal requirements. The laboratory tests of efficiency will facilitate a fairly close estimate as to whether a given cleaner will serve only a short period under normal dust concentrations in the field before it will lose its efficiency or build up too large a restriction or pressure drop.

Plain Dry Filters: If the filter medium used is loosely woven or packed, plain dry filters may stop practically all of the dust at first, but will later unloose that previously caught, by channeling. If, on the other hand, the material is too closely packed or felted, it may indefinitely stop all of the dust, but as more dust is caught the resistance will increase to such an extent that the pressure will build to a point restricting flow.

Some dry filters are slightly less efficient when new; they require a small amount of dust to fill the larger pores in order to develop their full efficiency. It was also found that cheap felt or packing made of frowsy material and having only a small admixture of wool is liable to be lumpy and unsatisfactory for gas filters. Filters of such materials will show a much lower dust removal efficiency and, especially after long continued use, higher restriction. Any felt media other than 100 per cent wool will tend to pack when exposed to saturated gas, causing either shrinkage and bypass or restriction to flow. Also, when the filter media or elements be removed, such as felt, they should be replaced with a new felt and not washed in an oily liquid, as was found in some cases, because the oil remaining tends to make the resistance build up rapidly by virtue of the coalescence of the dust on the viscous substance and not allow the particles to bound off and fall to the bottom of the manifold or shell. We found also that dry filters were more efficient for the same reason.

Plain Oily Filters: If sufficiently thick and of closely packed material, plain oily filters show initial efficiencies well above 85 per cent, and in some cases as high as 90 per cent. But this is only the initial efficiency and these good qualities rapidly vanish as the fibres or interstices become heavily coated with dust, especially along the parts of least resistance through the filter. When all of the oil on these fibres has been absorbed, the restriction usually does not rise but the dust eventually channels, leaving small dry tunnels through the filter. Therefore, only large particles and a small amount of fine particles will be stopped.

Inertia Type or Centrifugal Cleaners: These cleaners are, as a general rule, unable to handle satisfactorily anything except the coarser particles. Designers sometimes raise the efficiency by restricting the area of the inlet passage where the whirling motion is imparted; but when this is done the restriction is increased and will become prohibitively high at increased velocities, and at low flows the power to separate dust is almost entirely lost. Tests showed cleaners of this type do not furnish adequate protection under severe dust conditions.

Other Types of Filters: Oily wire, steel and glass wool, metal ribbon, fine screen, wire cloth, packed oily pasteboard, sponge rubber, organic fibres, metal shavings and spring wound filters were all found in this survey of the manufactured filters, and discarded as being of no use to the gas industry.

Self-washing and oil bubble types were found to be very efficient in large units, but not practical and applicable to our compact requirements.

Liquid contact types of gas cleaners were found to be the most efficient of the types for large installations other than service filters or appliance filters and a separate study of this type of equipment is being made in our laboratories at the present writing.

Conclusions:

Of all these various types our tests showed the only device near perfection for our type of demand was a filter made of cast iron with a felt filter medium so designed as to be readily accessible for removal and examination. It was found by using a 100 per cent new white wool felt made to our specification, of 100 per cent pure new white wool ¼ inch thick and of a density of 0.2083 pounds per 1 square foot of area, that the porosity was automatically taken care of. We use on our system approximately 1 square inch of area to every 4 cubic feet of gas at 8 inches water. This we found gave us the desired results and has proved itself over long periods of actual field tests.

SAFE CONNECTIONS TO HIGH PRESSURE MAINS*

A recent development in replacing service pipes to the consumers' premises has furthered the practice of safe gas distribution. This development has eliminated the necessity of working against the pressure of blowing gas, with the consequent danger of igniting the gas and injury to the workmen, due to flying particles of dust and rust in the gas main.

This new method makes use of the principle and the tools developed in conjunction with the pressure control device and extension fitting as described in the Sub-Committee Report on Safe Gas Distribution Practice, Pacific Coast Gas Association, in 1933. (P.C.G.A. Vol. 24, P. 37).

A brief description and uses of the pressure control device and extension fitting, or more properly called the pressure control tools and pressure control fitting, is necessary for the proper understanding of the new method of replacing service connections to gas mains. The pressure control fitting and tools are used to make extensions, repairs, replacements, abandonments on steel gas mains. The pressure control fitting may be installed on a gas main without shutting down the line, and thereafter may be used as a line valve.

The pressure control fitting is made of a short length of steel tubing, drilled steel bar or pipe, with one end plugged and with inside and outside threads on the open end. A hole is drilled transversely through the center of the fitting, the drilled hole being slightly larger than the size of the main the fitting is designed for. The fitting can be used as a solid fitting to slip over dead-ended mains, or split for installation on existing mains. The fitting is welded to the main and a hole is drilled completely through the main, the drill passing through a valve screwed to the open end of the fitting and lengthwise into the fitting. The drill is raised, the valve closed and tapping machine removed. A rubber expanding plug is then inserted into the fitting through the stuffing box and the valve on the fitting; the rubber plug passing completely through the hole in the main. The plug is then expanded inside the fitting to shut off the flow of gas in the main. The repairs, extensions, etc., to the down-stream side of the main are then made

*Contributed by Theodore Hoffman and Allan Larry, Los Angeles Gas and Electric Corp.

with no danger from leaking gas. The rubber plug is removed through the valve and stuffing box, and the valve closed. A pipe plug is screwed into the inside threads of the fitting through the stuffing box and valve with a socket wrench. The valve is removed, the fitting capped, and the installation is completed.

The advantage of the pressure control fitting is that it can be installed anywhere on the main, and without reducing the line pressure. It may be utilized at a later date as a line valve by inserting the rubber stopper into the fitting as described above, and the cost is but a fraction of a similar valve. A positive shut-off in the line is always assured by the use of this fitting.

The pressure control tools consist essentially of a rubber expanding plug, a stuffing box, a welding or drive pin, a lever valve, a special bushing, and a pipe plug socket wrench. Pressure control tools and fittings are designed for use on 1-inch to 6-inch pipe.

In the past, in order to remove an old or leaking service pipe from the main and install a new service pipe and connection to the main, it was necessary to remove the pipe and fittings from the main while the gas was blowing freely. A steel welding or drive pin was then driven into the hole in the main to stop the flow of gas. Upon completion of welding the new service fitting to the main and connecting the new service, the pin had to be removed and the fitting capped against the blowing gas. It is apparent that this method was not conducive to safety.

With the use of the pressure control tools, street tees and service tees connecting a service to the main may be safely removed. The new connection is then made to the main and the fitting plugged without the loss of gas and without the hazardous conditions formerly encountered.

The method now in use by the Los Angeles Gas and Electric Corp. for removing street tees and service tees connected to a main utilizes the pressure control tools and increases the usefulness of this device. A steel plate and special bushing are also used. The steel plate is clamped over the fitting by chains which encircle the main. A hole is then drilled through the plug or cap in the fitting, the drill passing through a valve screwed to the plate; a leather gasket fits over the plug to stop any leaking gas. (See Fig. 1 which illustrates a street tee screwed into a coupling welded to the main.) The drill is removed and the valve closed. The welding pin is then placed in a stuffing box, the stuffing box screwed into the valve, the valve opened and the pin driven into the orifice in the main, thus preventing gas from blowing. (See Fig. 2, illustrating the method of driving welding pin into main. In this case a service tee is shown welded to the main.) The old service pipe and connections are then removed. A new service tee with both inside and outside threads, similar to the threads on the pressure control fitting, is welded in place over the welding pin, a clamp fastened around the main with chains to hold the welding pin in place while welding. The weld is tested and the new service welded to the service fitting.

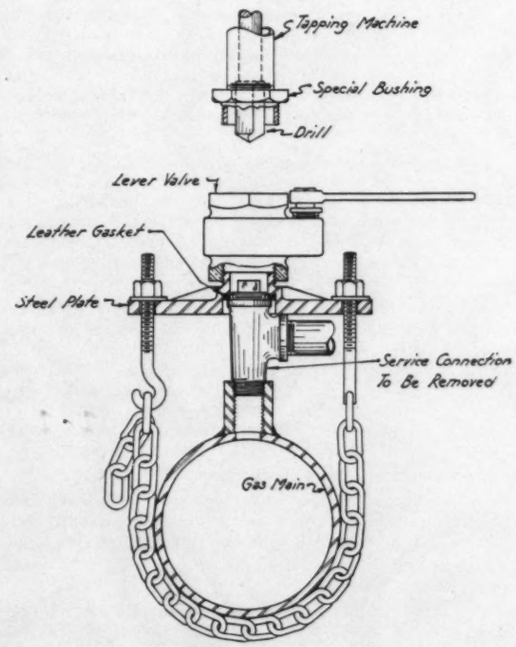


FIG. 1. Method of drilling out pipe plugs and caps in service connections.

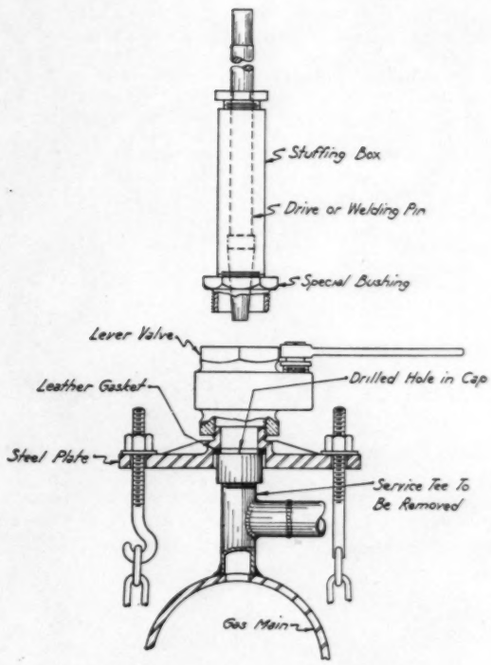


FIG. 2. Method of driving welding pin into main through drilled hole in pipe plug or cap.

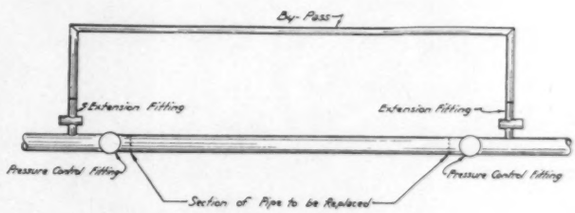


FIG. 3. Diagram illustrating use of pressure control and extension fittings.

The valve is then screwed to the fitting, and the stuffing box screwed into the valve over the welding pin that is still in place. The pin is then removed through the valve and stuffing box, and the valve closed.

All that remains now is to plug the fitting with the socket wrench and a pipe plug. The plug is placed in the socket wrench, the wrench placed in the stuffing box, and the stuffing box screwed into the valve. The valve is then opened, the socket wrench lowered and the plug screwed into the inside threads on the fitting. The valve is removed, and the plug securely tightened. The fitting is then capped over the plug. The installation is now complete except for wrapping the pipe with protecting wrapping and backfilling the trench.

Obviously, the same method can be used to connect new services to the main, using a service tee with inside and outside threads as described above. The tee is welded to the main and the main tapped through the valve. The fitting is then plugged through the stuffing box and valve as in the case of replacements.

Since the development of the pressure control fitting and tools, and the subsequent report made on Safe Gas Distribution Practice in 1933, one new improvement has been made on the pressure control fitting. This has been done by welding two pipe nipples to the pressure control fitting, thus converting it into an extension fitting.

This improvement further increases the usefulness of this fitting, especially in the replacement of a section of line by using a by-pass (see Fig. 3). This is done by welding extension fittings to the side of the line upstream and downstream from the section of line to be replaced, the shorter nipple on the extension fitting being welded to the main. The side of the main is tapped in the usual manner with the tapping machine screwed to the longer nipple. The rubber plug is inserted and expanded into the fitting proper,

through a valve and stuffing box. The threads are cut off the end of the longer nipple and the by-pass welded to this end. The rubber plug is removed and the gas allowed to enter the by-pass.

A split pressure control fitting is then welded on the line upstream and downstream to these two by-pass connections. The main is then plugged through these fittings with the expanding plug, and the section of line replaced. The rubber plugs are then removed, and the pressure control fittings plugged and capped, thus putting the replaced line in service again. The extension fittings are now plugged with rubber expanding plugs, and the by-pass removed. A dead end is welded to the longer nipple on the fitting, and the rubber plug removed. The fitting is then plugged and capped, thus completing the installation.

From the foregoing example it is readily apparent that the development and use of the pressure control fitting and extension fitting have practically eliminated the installation of line valves for repairs or extensions to the line. By the use of these fittings, inconvenience to consumers through closed lines has been eliminated, thus increasing consumer satisfaction and company good will, and the hazards to the workmen due to the use of high pressure gas have been lessened, thus making gas distribution safer.

The Effect of Humidity on Meter Proofs*

THIS general subject has been investigated along the following lines.

1. Effect of Gas Humidity on Area of Meter Leather Strips.
2. Effect of Gas Humidity on Proof of Meters on Test Racks.
3. Effect of Humidity of Prover Air on Meter Proofs.

EFFECT OF GAS HUMIDITY ON AREA OF METER LEATHER STRIPS†

In the 1934 Report of this Committee, (P. C. G. A. Proc., Vol. 25, P. 89), a report and graph were published showing the effect of gas of controlled relative humidities on the area of three sets of meter leather strips (new leather) of various tannages, both oiled and non-oiled. It was shown that:

1. The strips in 5 per cent R. H. gas shrank.
2. The strips in 40 per cent R. H. gas remained the same.
3. The strips in 90 per cent R. H. gas expanded.
4. There was no significant difference in behavior, with respect to either rapidity or magnitude of change, between the oiled or non-oiled specimens.

Guy Corfield

This test was continued for a period of 180 days until no further change in dimension was found. The humidities of the two extreme sets were then reversed: that is to say, the specimens formerly exposed to 5 per cent R. H. gas were put in the 90 per cent R. H. compartment, and vice versa; the strips in the 40 per cent R. H. compartment were not disturbed. Fig. 1 brings the test up to date, and shows the behavior of the strips after this reversal of humidities. It will be noted that there was an immediate reaction to the changed conditions, amounting to an almost complete reversal, with respect to the strip areas. This appears to be a satisfactory confirmation of the originally observed trend.

Fig. 2 shows similar data on strips of leather cut from a diaphragm taken from a meter that had been in service seven years and was running fast when removed. A similar trend was observed indicating that age had little retarding effect on the susceptibility of leather to humidity changes.

EFFECT OF GAS HUMIDITY ON PROOF OF METERS ON TEST RACKS*

A test was conducted in which gas of controlled relative humidities was passed through three similar sets of 14 meters, equipped with diaphragms with tannage and treatment similar to the new leather strips already discussed.

Every effort was made to eliminate mechanical and other upsetting factors that might obscure possible humidity effects. The meters were all assembled with care and precision; they were run-in, all on 40 per cent R. H. gas, until proof became constant; all proofs were made at the same prover and prover room temperatures (plus or minus 2 degrees), the meters being temperature conditioned over night on wooden platforms, in constant temperature prover room, prior to test; they were carefully corked in transit from rack to prover room; the meters on 90 per cent R. H. gas were proved with 90 per cent R. H. prover air, and those on 40 per cent and 5 per cent R. H. gas with 25 per cent R. H. prover air; gas rate through all meters was 30 cu. ft. per hr.

All meters were run on 40 per cent R. H. gas for two months and then proved, this proof being considered as the starting proof for the test and shown on the graph as zero days. They were then run an additional 51 days on 40 per cent R. H. gas to be sure that mechanical condition was stabilized; as shown in Fig. 3, the proof changed only slightly. The gas through one group was then changed to 90 per cent R. H.; through another, to 5 per cent R. H.; the third group was left on 40 per cent R. H. gas; proofs were made at frequent intervals.

Fig. 3 gives the results of this test, showing *averages of per cent change in proof* for each of the three groups. A very definite proof trend developed, indicating speeding-up on dry gas and slowing down on wet gas. As shown on the curves, there was an immediate change in proof in the two groups of changed humidity, so that after a net period of 43 days one group was 0.6 per cent slow and the other 1.1 per cent fast, a spread or change, from "wet" gas to "dry", of 1.7 per cent.

In the test just described the groups of meters were relatively small and some of the diaphragms (such as the unoiled ones) would not ordinarily be used in service. The data therefore, were not considered of conclusive practical significance, and a second test was made, as follows:

A group of 90 meters were selected, equipped with standard oiled diaphragms and assembled and adjusted as in standard shop procedure. These meters were "run-in" to constant proof, by passing through each one approximately 16,000 cubic feet of gas with a relative humidity of 70 per cent. They were then given a further "run-in" on 40 per cent relative humidity gas for three weeks, at an average gas passage of 29 cu. ft. per hour. All were then set to exactly correct proof at both check and open flow. They were then considered ready for the Humidity Effect test and placed on the test racks.

They were immediately subjected to 5 per cent relative humidity gas, for four weeks, with periodic proof, and then suddenly changed to 90 per cent relative humidity gas, on which they were operated for three weeks. Throughout this period the gas rate was 29 cu. ft. per hour, and the same proving precautions were taken as in the former test, as regards constant temperature and humidity of prover air.

The results of this second test are shown in Fig. 4, as averages of the change in proof of the 90 meters. It will be observed that the meters changed from O.K. to 1.27 per cent fast after 28 days operation on dry gas; when they were changed suddenly to wet gas, the proof moved up to 0.09 per cent slow after an additional 7 day period, and to 0.43 per cent slow after a further period of 21 days. This behavior is consistent with the preceding test and, for that matter, with all tests involving leather vs. gas humidity.

It is concluded from these tests that:

(1) Relative humidity has a decided and consistent effect on leather diaphragm meter proofs, a low humidity making the meters speed up and a high humidity causing them to slow down.

(2) The change in meter proof is proportional, in amount, to the change in gas humidity.

(3) The change is more rapid when caused by a wet gas, than when caused by a dry gas; in other words, a typical meter in equilibrium with 40 per cent relative humidity gas will take approximately 45 days to reach equilibrium in a "dry" gas, but only 15 days to reach equilibrium in a "wet" gas.

*Committee Report: Guy Corfield, L. A. G. & E. Corp., chairman; F. H. Coble, So. Calif. Gas Co.; Otto Goldkamp, San Diego Cons., G. & F. Co.; H. S. Harris, L. A. G. & E. Corp.; E. H. Mohr, L. A. G. & E. Corp.; F. H. Winslow, So. Counties Gas Co.

†Submitted by E. H. Mohr and Guy Corfield.

*Submitted by E. H. Mohr, H. S. Harris and Guy Corfield.

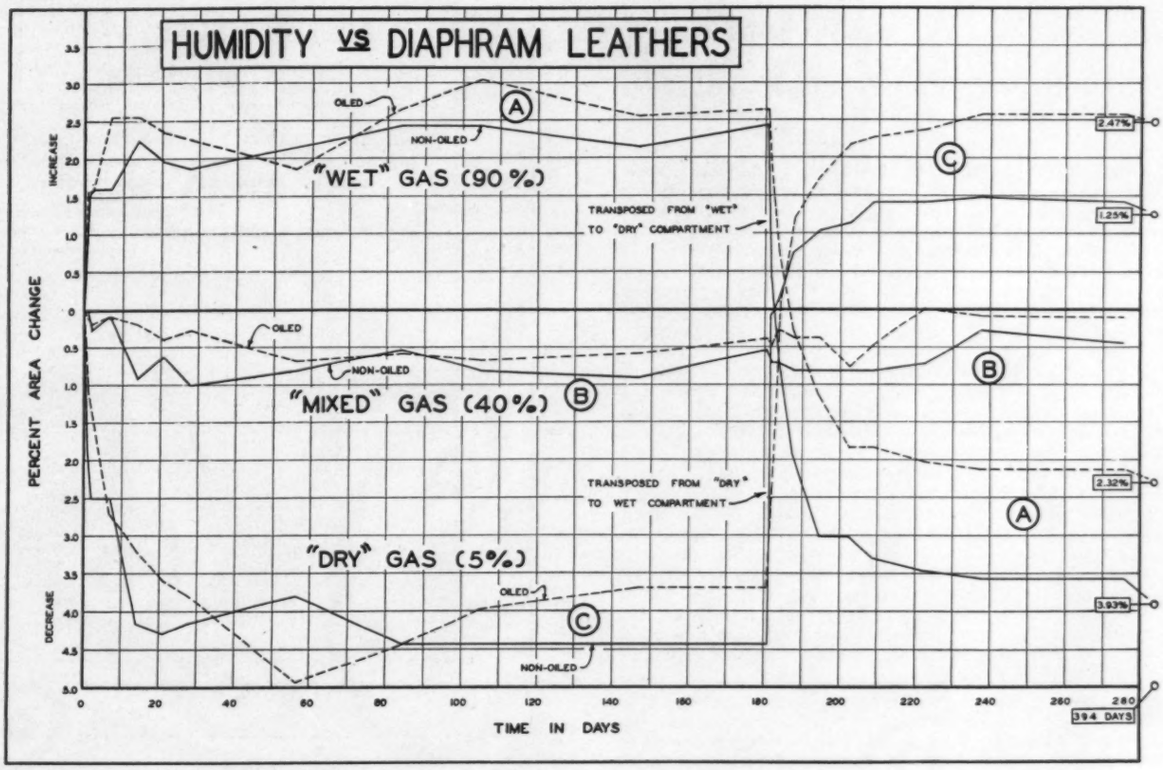


FIG. 1.

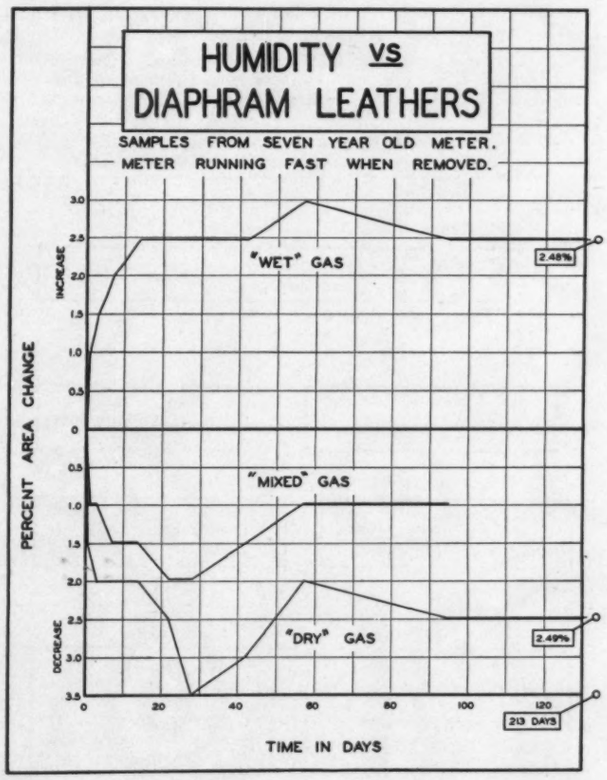


FIG. 2.

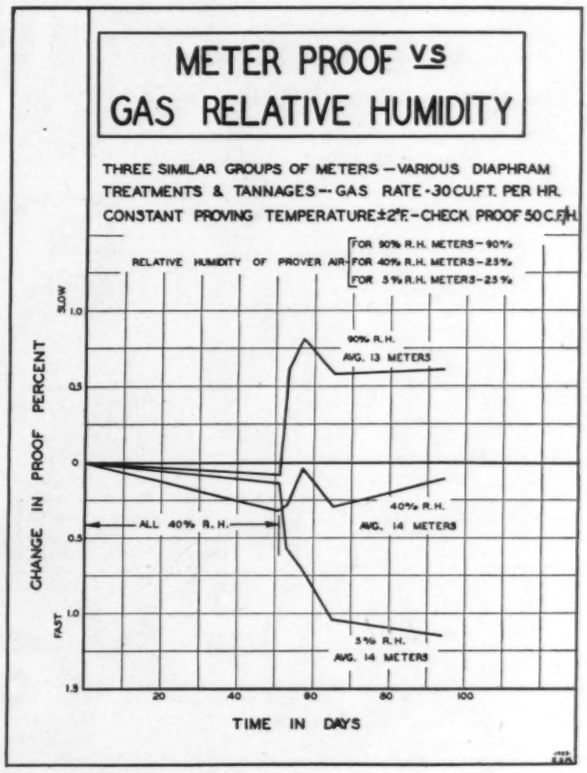

METER PROOF VS GAS RELATIVE HUMIDITY
THREE SIMILAR GROUPS OF METERS — VARIOUS DIAPHRAM TREATMENTS & TANNAGES — GAS RATE - 30 CU.FT. PER HR.
CONSTANT PROVING TEMPERATURE ± 2°F. - CHECK PROOF 50 C.F.H.
RELATIVE HUMIDITY OF PROVER AIR
FOR 90% R.H. METERS - 90%
FOR 40% R.H. METERS - 25%
FOR 5% R.H. METERS - 25%
CHANGE IN PROOF PERCENT
SLOW
FAST
90% R.H.
AVG. 13 METERS
ALL 40% R.H.
40% R.H.
AVG. 14 METERS
5% R.H.
AVG. 14 METERS
TIME IN DAYS

FIG. 3.

It follows from these conclusions that if meters are "run-in" in the shop, prior to final outgoing proof and adjustment, the running-in gas (or air) should be at a relative humidity comparable to that of the gas on which the meters will operate in the field.

EFFECT OF HUMIDITY OF PROVER AIR ON METER PROOFS*

Using values in Table 11, Gas Engineers' Handbook, Pacific Coast Gas Association, it may be seen that saturated air contains 2.55 per cent by volume of water vapor, or that bone dry air will increase in volume 2.62 per cent after it is saturated with water. This would indicate that if a meter containing moisture were proved with dry air the measured air leaving the prover would increase in volume while going through the meter, showing a fast meter with a maximum theoretical error of 2.62 per cent. The Bureau of Standards "Standard Method of Gas Testing," Circular 48, dated 1916, under the method of bottling provers states that the air should be water saturated when bottling under certain obvious conditions and when this is not done it further states a probable error of approximately 3 per cent.

Up until a few years ago water was used as a prover seal, and this no doubt automatically brought the air in the prover to nearly the point of saturation. Oil was recently adopted as a prover seal, and at that time little thought was given to the humidity of the prover air possible because it was felt that the air going through the meter was not in contact with the water sufficiently long to absorb any appreciable amount of water vapor, or as in the case of some distribution systems the advent of dry natural gas was considered to have eliminated any moisture in the meter. In order to determine whether or not the prover air was in contact with the moisture in the meter sufficiently long to cause any error in proof and if so how close to theoretical absorption this might be, the following tests were made.

San Diego Tests

(a) A group of 18 meters were removed from districts known to be wet, and proved, under identical temperature conditions, with "wet" prover air (85 per cent humidity) and "dry" prover air (15 per cent relative humidity). The average increase of dry proof over wet proof was 2.17 per cent.

(b) A group of 10 meters that had been repaired, tested, and made ready for service were similarly proved on "wet" and "dry" air, with no difference in proof found in any case.

Los Angeles Tests

(a) A group of 24 iron case meters were run for some time, half on gas of approximately 90 per cent relative humidity, and the other half on gas of 4 per cent relative humidity. It was expected, and later found to be the case, that the 12 meters on 90 per cent R. H. gas were subject to liquid water condensation because of lack of absolute humidity control. These two groups were subdivided into groups of six and proved on "wet" (90 per cent relative humidity) and "dry" (4 per cent relative humidity) prover air, with method and results as shown in Table No. 1.

*Submitted by Otto Goldkamp and H. S. Harris.

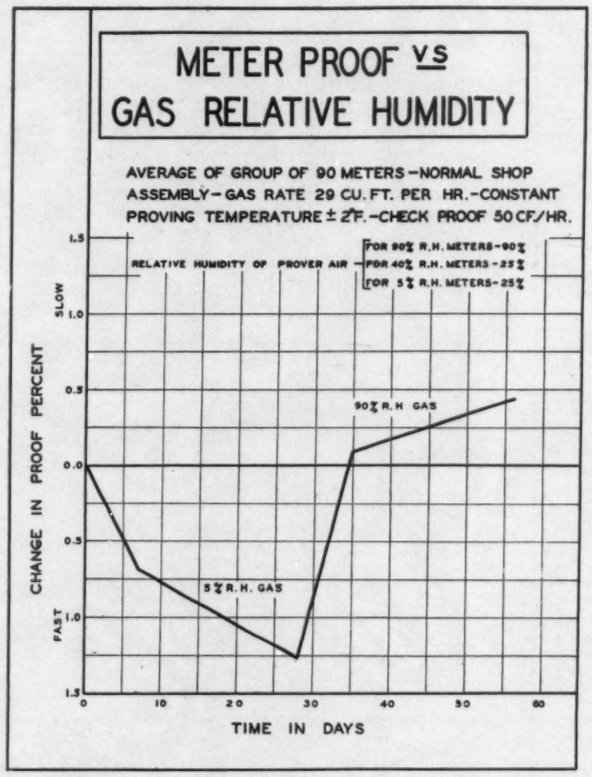
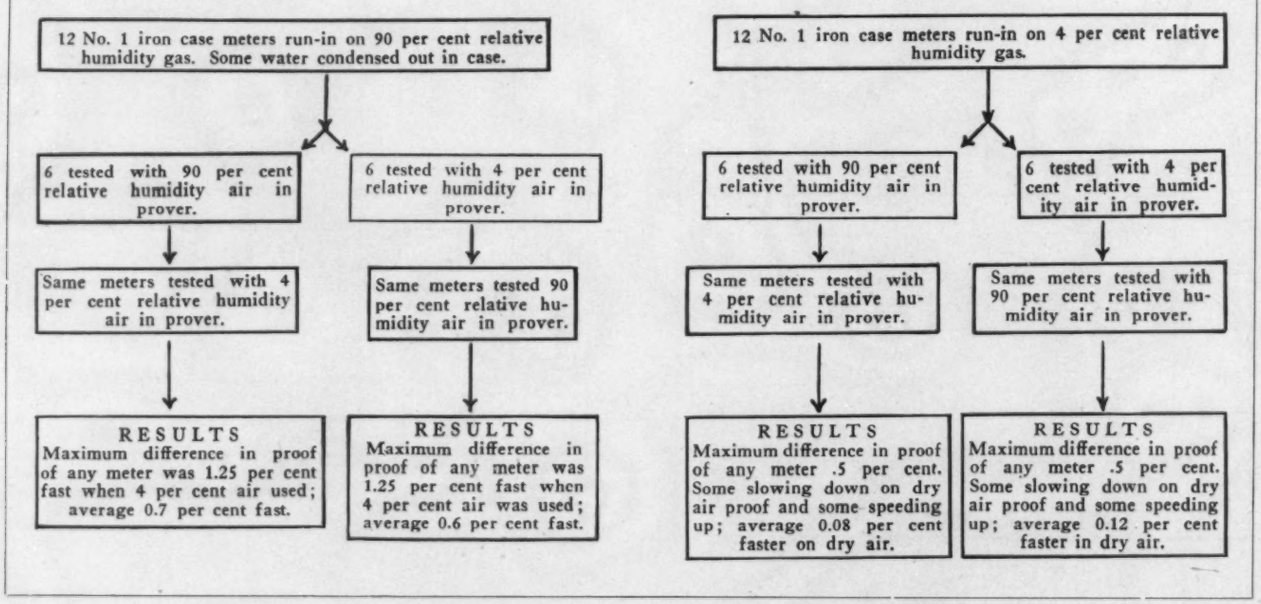


FIG. 4.

(b) A second test made was with 12 addition iron case meters, again run-in at 90 per cent relative humidity but with a greater attempt for control so that moisture would not condense out. The

TABLE NO. 1.


12 No. 1 iron case meters run-in on 90 per cent relative humidity gas. Some water condensed out in case.
6 tested with 90 per cent relative humidity air in prover.
6 tested with 4 per cent relative humidity air in prover.
Same meters tested with 4 per cent relative humidity air in prover.
Same meters tested 90 per cent relative humidity air in prover.
RESULTS
Maximum difference in proof of any meter was 1.25 per cent fast when 4 per cent air used; average 0.7 per cent fast.
RESULTS
Maximum difference in proof of any meter was 1.25 per cent fast when 4 per cent air was used; average 0.6 per cent fast.
12 No. 1 iron case meters run-in on 4 per cent relative humidity gas.
6 tested with 90 per cent relative humidity air in prover.
6 tested with 4 per cent relative humidity air in prover.
Same meters tested with 4 per cent relative humidity air in prover.
Same meters tested with 90 per cent relative humidity air in prover.
RESULTS
Maximum difference in proof of any meter .5 per cent. Some slowing down on dry air proof and some speeding up; average 0.08 per cent faster on dry air.
RESULTS
Maximum difference in proof of any meter .5 per cent. Some slowing down on dry air proof and some speeding up; average 0.12 per cent faster in dry air.

purpose of this test was to determine whether or not meters running with gas at high relative humidity which did not attain the dew point would show any difference in meter proof when either dry or wet air was used in the prover. These meters were divided into two groups of six each and proved in the same manner as the previous 12 iron case meters, which were run-in on 90 per cent relative humidity gas. The results of this test show that the maximum change in proof on any one meter was 1½ per cent faster when using dry air in the prover than when wet air was used; the average change was .8 per cent fast. On examination of these meters it was found that in spite of control precautions water had condensed out in all of them.

(c) A new group of 12 meters was run with the humidification apparatus set at 72 per cent relative humidity. Again dividing these 12 meters into two groups of six each and testing as before, eight meters showed no difference in proof when tests were with wet or dry prover air; one meter picked up 1 per cent on dry air as against wet air; two meters picked up ½ of 1 per cent on dry air as against wet air; one meter dropped ½ of 1 per cent on dry air as against wet air.

Conclusions

It is concluded from the above tests that a meter containing liquid water should be proved with water-vapor saturated air, but when meters do not contain liquid water it does not matter whether the prover air is saturated or dry.

The House Type Regulator as a Differential Valve

By E. H. Fisher
Coast Industrial Gas Company

IN THE control of gas flows there are a number of situations which call for a simple and reliable differential valve. Two of the most important applications are here discussed, namely the boosting of distribution pressure with an increase in load; and the automatic changeover from positive to orifice meter in a wide range measurement set. For these purposes the ordinary house type regulator, familiar to every service man, is readily adaptable.

E. H. Fisher

Fig. 1 shows the arrangement for boosting the outlet pressure during periods of heavy load. Control is accomplished by means of a house type regulator, shown at A. The only change necessary is to reverse the linkage from the dotted position to that as shown. The pressure of the spring on top of the diaphragm then holds the valve closed.

An orifice, B, is installed in the main line. It should be of proper size to give a differential of about 2 inches of water at the rate of flow at which increased pressure is desired. The upstream side of the orifice is connected to the bottom diaphragm chamber, or what is normally the outlet of the regulator, A. The downstream tap is connected to the vent on the top diaphragm chamber. If this chamber is not gas tight, it should be made so by packing the adjustment cap. To what is normally the inlet of the regulator, and in this case the outlet, is connected a small reducing regulator, C, such as is used for pilot controls. It is well to include a throttling valve between the two regulators to permit slowing down the operation of the control.

The main regulator, D, may be weight, spring or pilot operated, but if weight operated, should be of a type in which the top diaphragm chamber can easily be made gas tight. The outlet of regulator C is connected to this upper chamber and a bleed valve is installed at E as in the conventional pilot connection.

The operation of the system is quite evident. At low loads the differential valve, A, is closed and all pressure on the top chamber of the main regulator is bled to atmosphere. The regulator then delivers a pressure of 6 pounds or whatever is set by the weights. When the flow is sufficient to cause a differential at B of 2 inches of water, the reduction of the pressure on top of the diaphragm of the differential valve, A, causes the valve to open, admitting gas to the reducing regulator, C. This regulator is set for whatever extra pressure is required on the downstream line. The extra pressure augments that of the weights on the main regulator, opening the valve until the desired increase in outlet pressure is obtained.

If the regulator to be controlled is of the pilot instead of weight operated type, the pilot is left connected as shown by the dotted outline at F, Fig. 1. This pilot is set for the lower outlet pressure, in this case 6 pounds. The other pilot valve, C, must then be set for the full value of the higher outlet pressure or 10 pounds. The pilot, F, will shut off when the higher pressure is admitted to the diaphragm chamber, and operation will be entirely from the pilot valve, C.

A further application of the differential valve, that of controlling a wide range meter set, has been in successful operation for some time. Loads are occasionally encountered which are large enough to call for an orifice meter, but which, during off periods, are so

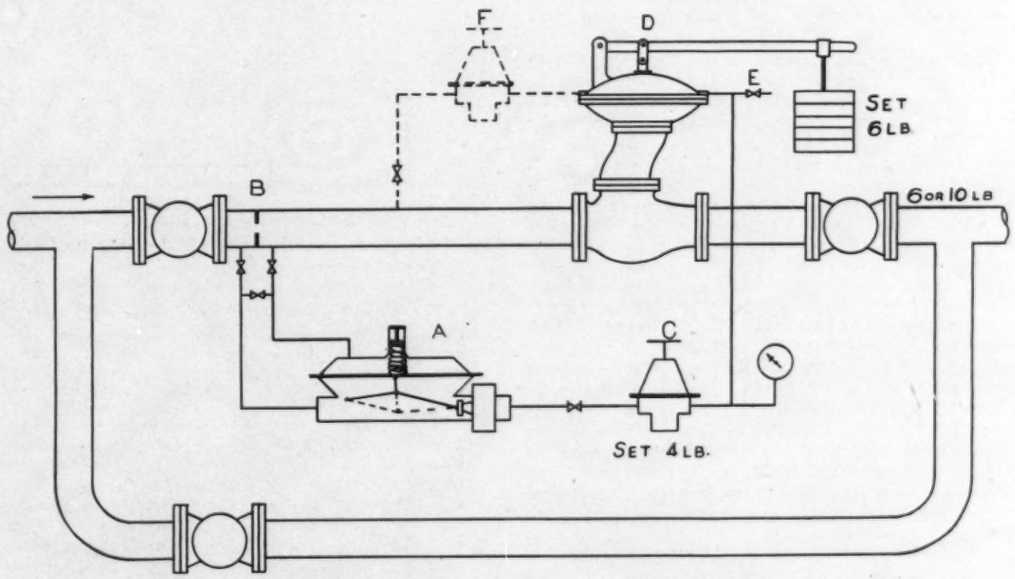


FIG. 1. Arrangement for raising distribution pressure during periods of high demand.

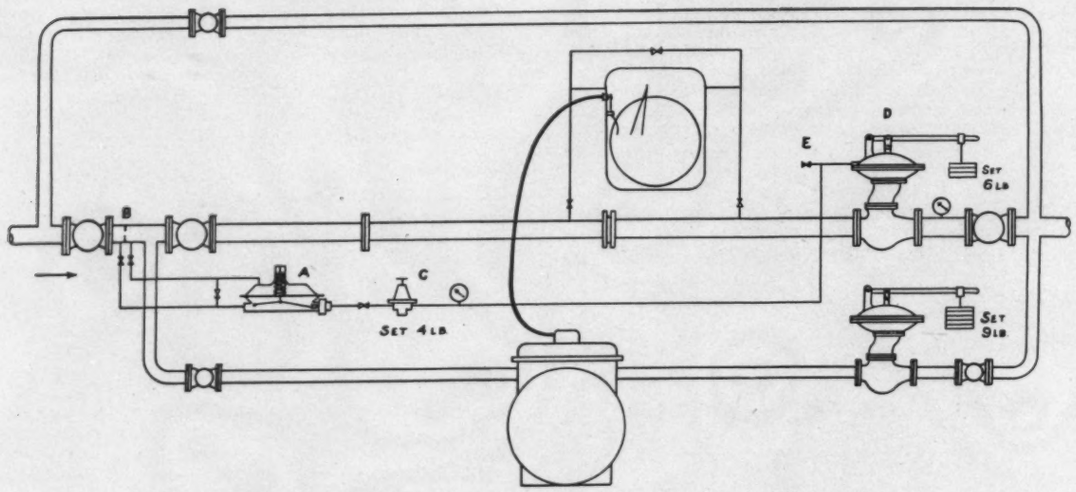


FIG. 2. Control for a combination meter set in wide range metering.

low that a positive displacement meter is advisable for accurate measurement. Some device is necessary for shutting off the orifice meter when the load drops to a certain value ,and vice versa, for turning it on with an increase in load. It is also desirable that the displacement meter be shut off, or nearly off, when the orifice meter is on. This latter results in a higher chart reading and, consequently, greater accuracy on low and moderate readings of the orifice meter.

Fig. 2 shows how the requirements for automatic changeover may be adequately met by slight additions to the reducing regulators that are normally installed in such a meter station. The main reducing regulator, D, in the orifice meter line, is controlled exactly as shown in Fig. 1. In this case there is the additional requirement that the main regulator, D, must be of the tight closing type having soft seats.

Gas from the displacement meter passes through another reducing regulator which can be of any type, not necessarily tight closing.

The operation is similar to that previously described. When the flow causes a differential of 2 inches or more on the control orifice, B, gas pressure is applied to the top of the diaphragm on the orifice meter regulator. The regulator then delivers gas at an outlet pressure of 10 pounds. The displacement meter regulator, being set for 9 pounds, remains shut off.

Conversely, when the flow decreases to a point where the drop is less than 2 inches of water across the control orifice, the differential valve closes and pressure bleeds off from the main diaphragm chamber at E. The outlet pressure drops and at 9 pounds the displacement meter regulator comes on and takes the load. This 9 pounds on the outlet line then closes the orifice meter regulator entirely off.

This compounding of the outlet pressure on the higher load is in most cases an advantage and can be increased if desired. On the other hand, it is possible to make the difference in outlet pressures less than a pound, by the use of a large diaphragm or pilot on the displacement meter regulator.

The station was found to have a further advantage not anticipated. The orifice meter was built to give a full scale deflection at slightly above normal full load with 20 pounds pressure on the line. In case of an abnormal demand together with a lower line pressure, the pen would run off scale, except that the capacity of the orifice meter regulator is approached. As a result the outlet pressure drops off and the displacement meter comes on and helps to carry the peak load. It was found desirable to install an orifice in the outlet of the displacement meter to limit the amount which it would carry under such conditions.

As previously mentioned, the orifice meter regulator must shut off tight during periods of low load. This can be checked very easily if a pressure gauge is installed as shown between the outlet valve and the regulator. With the load on the displacement meter, the closing of this outlet valve will result in a rise in pressure on the gauge if there is any leakage through the orifice meter regulator.

In adapting the house-type regulator, if the linkage is not easily reversible, the same result may be secured by the use of a dead weight regulator in the inverted position. The connections from the control orifice must in this case be reversed. This type is of course less adjustable. The differential valve can be set to operate reliably on a differential as low as 1 inch of water. If the control is designed to operate at 2 inches, there is then a considerable range of adjustment in either direction.

In cases so far considered, the control orifice has been on the high pressure side of the main regulator. This is necessary to supply sufficient pressure for straight pilot operation, but on weight or spring loaded regulators the orifice may be on the low pressure side. On combination metering, if the orifice is in the steady downstream pressure, changeover will occur at a certain rate of flow. If, on the other hand, both control orifice and orifice meter are on the upstream side, changeover will occur at a certain differential reading, regardless of variations of pressure. This is usually more desirable.

On the district regulator, operating at two different pressures, the control orifice on the downstream side might result in instability. This is because a given flow at the higher pressure would not maintain as high a differential as it would at the lower pressure. The upstream control would not be subject to this trouble. It would, however, operate sooner on an increasing load if the upstream pressure were low, and this should be desirable.

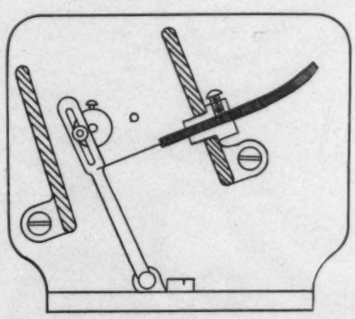


FIG. 3. Connection to a displacement meter for remote operation of a volume market.

The pressure ratings of the cases on the differential valves must, of course, be considered. Several cases have been tested and burst at 150 pounds per square inch or higher. They should, therefore, be safe on 10 to 20 pounds per square inch, or more if the two halves are clamped between steel plates.

The orifice in the differential valve should, in most cases, be of minimum size. However, if there is a tendency for the load to swing back and forth about the point of changeover, the operations of the control can be decreased by using a larger outlet orifice in the differential valve. The pressure on the seat in the closed position then calls for extra differential to open the valve, but does not affect the closing, and the control has more of a tendency to remain in one position or the other. If the orifice is of appreciable area, it may be necessary to alter the seat disk mounting to withstand tension in place of the usual compression.

If, in a combination meter set, the control orifice gives 2 inches of water differential at the capacity of the positive meter, and the orifice meter capacity is five times as much, the differential on the control orifice will become 25 times as much or 50 inches of water at full load. In cases when this drop would be objectionable, the orifice plate may be hinged at the top in the line. With a light spring or its own weight to hold it shut up to differentials of about 4 inches, the plate would on any higher loads start swinging open and release the extra differential.

An added feature of interest on the combination meter set is an extra volume pen on the orifice chart, operated by the positive meter. Ordinary automobile choke cable is used to connect the two meters, with the shipping stop bushings from Westcott gauges as the end fittings. The operating wire through the cable should be considerably smaller than choke wire, No. 26 being used in this case. Details of the connection to a 500B meter index are shown in Fig. 3. This arrangement gives a complete pressure and volume record of the system on a single chart.

Present-Day Pipe Reconditioning Practice

By A. B. ALLYNE

Southern Counties Gas Company

DURING the past few years the construction of new pipelines has been at a minimum. In this interval, however, corrosion, unmindful of the depression, has continued and operating companies are now finding it necessary to repair and recondition a number of transmission systems constructed in the previous era of expansion.

A. B. Allyne

Methods of inspecting and reconditioning pipelines have not been standardized. In order to secure information on these methods, queries were sent to a number of important oil and gas companies throughout the United States. Some 31 companies have responded and this report is an analysis of their replies.

1. Size of Pipe Reconditioned

Some companies recondition pipe in all sizes from 2 in. up. No company reports reconditioning any pipe below 2 in. in diameter. Out of 19 companies, seven reconditioned 2. in. pipe, three reconditioned nothing under 3 in., four reconditioned nothing under 4 in., and five reconditioned nothing under 6 in. in diameter.

2. Inspection of Pipelines

The usual practice of deciding whether or not a pipeline has deteriorated sufficiently to need reconditioning is to dig test holes for inspection purposes. Of the 19 companies furnishing information on this point, six make no periodical inspections but depend upon increasing leakage to reveal serious corrosion. One company bars the line occasionally and if gas is found, uncovers 100 feet of pipe. Two other companies and perhaps others make periodical surveys of soil resistivity and acidity, leakage, and current carrying capacity of line, and only inspect in questionable locations. When test holes are dug, the distance between them will vary from 50 feet to one mile, each hole exposing from 2 to 18 feet of pipe. The condition of the pipeline is judged by varying standards. Some companies record the average condition of the exposed lengths, some the worst section of it, while others go to considerable pains to measure pit depth and weigh line condition by the deepest pit, the four deepest pits, or the six deepest pits. It is quite evident that the thoroughness of inspections is governed by local conditions and by what may be revealed by preliminary observations.

3. Interpretation of Inspections

In deciding whether or not it is feasible to recondition a line, eight companies are governed by the depth of pitting and the number and distribution of the pits. Three companies are more interested in the extent of pitting and the general surface corrosion as it might affect the pipe strength. The frequency with which leaks have occurred and the extent of pitting are the criteria in two cases, while another company considers the cost of gas lost by leaks and expense due to crop damage as against cost of reconditioning. One company estimates pipe can be reconditioned by spot and patch welding cheaper than it would cost to replace it with good used pipe.

4. Use of Cathodic Protection

One-half of the companies reported that they were either using or considering using electrical drainage wherever practical in lieu of reconditioning. The other half reported no experience with this form of protection to date. Reasons given for not using included proximity of other lines, poor electrical resistance of coating, high cost of power, etc.

5. Methods of Trenching

Nine companies stated that they used both machine and manual methods of trenching lines to be reconditioned. In seven cases, the trench is dug manually to the top of the pipe, the pipe then being pulled out with tractors. Seven others uncover to pipe surface with trenching machines, and then pull out the pipe with tractors or dig it out manually. In a few instances, the use of side wheel trenchers was indicated, this method removing practically all of the dirt with the top and sides of the pipe.

6. Junk Value of Pipe a Factor

In weighing whether or not an uncovered pipe should be reconditioned or junked, 11 companies stated they took into consideration the junk value of the pipe, while nine companies replied they did not.

7. Taking Lines Out of Service

Five companies replied that they always take a line out of service before reconditioning it; 16 companies do not.

8. Rotation of a Pipe Pitted on Bottom Only

In certain localities, leaking pipe has been found to be badly pitted and corroded on the bottom only, the remainder of the pipe surface being in excellent condition. Fifteen companies stated that when this condition is encountered, they made a practice of turning the pipe over, reconditioning it, and replacing with the corroded area on top. Six companies have not followed this practice.

In two cases, it was stated they have rotated this pipe 90° and 120° respectively, instead of 180°, thereby increasing the total life of the line still further. In one locality, the pipe is rotated 180° wherever internal corrosion has eaten a channel along the bottom of the pipe. A number of companies spot weld the pitted areas as well as rotate the pipe.

9. Place of Reconditioning

Apparently, the choice of the place of reconditioning is determined by existing conditions for each case, as the following summary indicates:

In field in the ditch	One
In field above ground	Five
In field above ground and in ditch	Five
In shop only	Three
In field above ground and in shop	Five
In all three places	Two

10. Welding Up Pits and Penetrations

Twenty-one companies stated they made a practice of welding up pits in a line while only one replied that it did not. When pits are large in area or a number of pits are close together, several companies weld patch plates over the affected areas. In two cases, the welding of pits is practiced only when 100 mils of pipe wall remain. If less than 100 mils remains, the pipe is either patched or junked. Two other companies stated that the welding of pits was practiced only when their depth exceeded 50 per cent of the wall thickness of the pipe.

The final word as to whether a pipe shall be repaired and put back into service or junked is apparently still a matter of opinion. In order to take the guesswork out of this important phase of pipe reconditioning, some definite criteria should be set up and followed. The reply from one company showed considerable thought had been given this matter, and since its structure might well be taken as a model, it is given below in full:

(a) When pipe condition is good except for few pits that still leave a minimum wall thickness of 130 mils, no welding is done.

(b) When pits leave only 100-130 mils of wall thickness, they are spot welded, provided they do not exceed an average of one pit/lineal foot per section of pipe. If they exceed this number, or if pitted section exceeds 200 feet, section is replaced.

(c) Patch welds are placed over pits that leave less than a minimum of 100 mils wall thickness, provided their number does not exceed an average of one pit per five lineal feet of pipe. If this is exceeded, or if pitted section exceeds 200 feet in length, section is replaced.

11. Permissible Depth of Pits Before Pipe Should Be Junked

It is the consensus of opinion of over one-half of the companies that the extent of corrosion (i. e., pit density) was the most important factor in determining if a pipe should be junked, rather than the depth of the pits. The actual weakening of the strength of the pipe due to this cause permits no economical plan of reconditioning and therefore is the determining factor in deciding whether to junk or not to junk.

The determining factors given by other companies included: How urgent was the need of the line; the cost of reconditioning vs. a new line; when pits were over one-half wall thickness; when pits were beyond a reasonable depth. In one instance, 2- and 3-inch pipe is junked when the pits are one-third the pipe wall thickness, while in 4-inch and larger the pits must be over one-half the wall thickness.

12. Methods of Cleaning Old Pipe

The methods of cleaning pipe are found to vary, and depend a good deal upon the conditions of a particular job. Of the 20 companies furnishing data on this point, 12 stated they used power-driven machines. Seven of these stated they used W. K. M. machines. One instance was reported where the W. K. M. machine was followed by chipping hammers and, after the pipe was dry, an abrasive cloth to remove rust. In five cases, the pipe was cleaned manually with wire brushes, hammers, hand cleaners, and files. Three additional companies use the above methods and in addition specified the use of Jinnett hand pipe cleaners. Five companies are using sandblasting, three of which, however, use this method as supplementary to other methods of cleaning. Two cases were reported where the old coatings are burnt off of the pipe either by an internal flame (1500°) or in a gas furnace.

13. Life Expectancy of Reconditioned Pipe

In estimating the additional life expected of a reconditioned pipe, seven companies considered the pipe as good as new, four 90 per cent, one 75-90 per cent, one 50-75 per cent, and one 50 per cent as good as new. One company estimated the additional life at 15 years, while two companies make estimates for each particular job, based on past life of line, kind of coating to be used, etc.

14. Bright Steel Surface vs. a Mildly Rusted One

The question as to whether to go to a bright steel surface before coating a pipe has occasioned considerable discussion. While a large majority of the companies would prefer to coat a bright steel pipe surface, it is generally admitted that it is seldom practical to obtain it. Summarizing the replies, nine companies prefer a bright steel surface but cannot always obtain it, seven always go to a bright surface, four prime over a mildly rusted surface, and two go to bright steel in the shop but prime over mildly rusted surfaces in the field.

15. Sandblasted vs. Brushed or Machine-Cleaned Pipe

Certain operators have contended that a better coating bond is obtained on a sandblasted surface than on a wire brushed or machine-cleaned one, which justifies the additional cost. In reply to this, five companies stated they were in accord with this view, six agreed the bond was better but that the extra cost was not justified, while nine stated that sandblasting possessed no advantage over other methods of cleaning as far as bond was concerned.

16. Coatings Used on Reconditioned Pipe

While there is still no general agreement as to the kinds of coatings to be used on pipe, the replies received indicate that the field has considerably narrowed in the last few years.

Of the 17 companies giving detailed information in this regard, 12 are using pipeline enamels of either asphalt or coal tar base. The six companies using asphalt coatings re-enforce them in most cases with asbestos felt, rag felt, or cotton fabric. Six companies are using coal tar coatings, most of them employ an asbestos felt wrapper as a re-enforcement.

The use of grease coatings was reported in two cases. This coating consists of a grease coat next to the pipe, followed by an impregnated fabric and an outer coat of hard grease. Wrappers are sometimes used on the outside of these coatings.

Three companies are using rigid cement shields in severe soils. The various coatings used beneath these shields include greases, asphalt enamel, and an asphalt chromated emulsion.

In one location where the soil conditions are considered severe, an asphalt mastic, applied ½ inch thick, is used where it is possible to bring the pipe to a central wrapping yard. In the field, a four-coat, air-blown asphalt job is resorted to, with a fabric re-enforcement between each coat.

The extensive use of outer protective shields as a protection against soil stress is one of the outstanding developments of the past few years. Until an impervious, yet inexpensive, pipe coating is developed, the selection of a protective medium for a particular line is apparently still a question of economics.

17. Coat Estimates for Reclaiming Pipe

While the cost of reconditioning different sizes of pipe will fluctuate over a wide area, the data tabulated below, although by no means complete, will afford some idea as to the magnitude of investment required to reclaim pipe.

(1)* 3-in. 15c per ft.; 4-in. 18c per ft.; 6-in. 20c per ft.; 8-in. 25c per ft:; 10-in. 30c per ft.

(5) On 2,000 ft. of 20-in. reconditioned in shop with welding of pits, cost was one-half that of new pipe.

(8) On 8-in. pipe:

Labor	$0.247 per ft.
Material	0.112 per ft.
Engineering, etc.	0.048 per ft.
	$0.407 per ft.

On 12-in. pipe:

Labor	$0.336 per ft.
Material	0.160 per ft.
Engineering, etc.	0.054 per ft.
	$0.550 per ft.

(Itemized data for above costs are also given.)

(12) Cost of reconditioning, 6-, 8-, and 12-in. pipe varies from 50c to 55c per foot for labor only. This includes inspection, uncovering, cleaning, transferring oil, welding, handling and backfilling.

(14) On 85 miles of 12-in., cost per foot:

Stripping	$0.086
Lifting	0.034
Hauling to yard	0.037
Backfilling	0.009
Cleaning	0.066
Storehouse and Misc.	0.016
	$0.248

(16) Cost of reconditioning 16-in. line in service was $1.00 per foot and included all labor charges and materials in applying two coats of coal tar enamel, outer asbestos wrapper, and electrically inspecting coating. Same work for 4-in. pipe cost 30c per foot. Same work for 2-in., minus wrapper, was 12c per foot.

(17) Varies greatly. Typical examples:

8-in. pipe	60c to $1.25 per foot
12-in. pipe	70c to $1.25 per foot

(22) Average costs over 5-year period for cleaning and priming pipe only:

Size	By Furnace	By W.K.M. Machine
4 -in.	$0.040	$0.023
6 -in.	0.0466	0.035
8 -in.	0.0536	0.040
10¾-in.	0.0913	0.042
12¾-in.	0.098	0.045
16 -in.	0.1007	0.051

Includes all labor incident to cleaning and racking pipe, fuel, power, repairs to equipment, and primer.

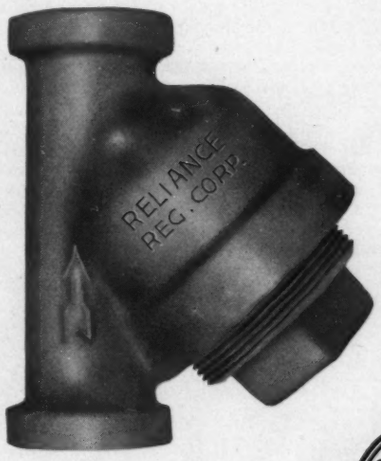
*Company code numbers.

KEEP DUST FROM

Regulators, Meters, House Piping, Pilot Lights, etc.

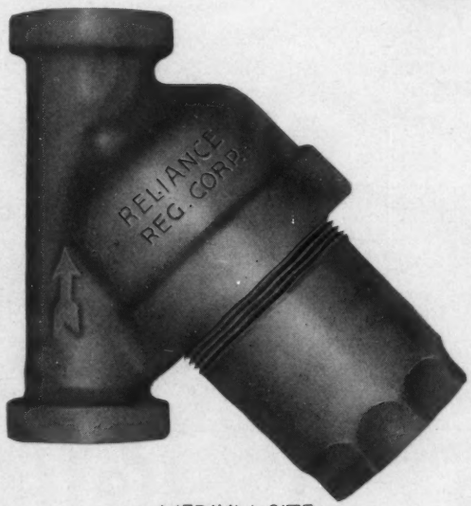
WITH

RELIANCE TYPE "A" FILTERS IN THE LINE



SMALL SIZE

REGULATORS YOU CAN RELY ON
RELIANCE
SINCE 1910
TRADE MARK



MEDIUM SIZE

FOR house service lines in dust areas of the distribution system, Reliance Type "A" Filters protect pilot lights, meters, regulators and house piping from accumulations of dust, and therefore minimize operation and maintenance expense from this source.

A standard body with ¾" connections provides for three sizes of Filters and Filter Elements. Filter Elements can be removed or changed from one size to another in a few moments without disconnecting the body from the line. This is possible by means of the 2" pipe threaded outlet through which the Filter Element is inserted or removed.

Filter castings are made to withstand working pressures up to 150 pounds. Tapped with ¾" female threads at both ends, but can be supplied with single or double union connections. Filters can be installed vertically or horizontally, with dust chamber hanging downward. Special all-wool felt is used in the filter pad and all seams are cemented with a water-and-oil-proof compound. Moisture in the gas does not impair the efficiency of the wool pad. Tests show that the filter has high capacity, with minimum pressure drop.

Easy to install, low priced and long lived

SEND FOR NEW BULLETIN NO. 35

RELIANCE REGULATOR CORP.

1000 Meridian Ave.

ALHAMBRA, CALIFORNIA

(23) Reconditioning usually runs about 30 per cent of the cost of the pipe.

(24) All costs on reconditioning 8-in. pipe amount to $0.473 per foot.

(32) Cost of reconditioning various sizes of pipe in central yard (Total handling and wrapping costs in yard only, consisting of unloading, testing, sandblasting, priming, and wrapping) are:

Per linear foot ($): 1-in. 0.0236; 1¼-in. 0.0271; 1½-in. 0.0300; 2-in. 0.0322; 3-in. 0.0450; 4-in. 0.0552; 6-in. 0.0884; 8-in. 0.1123; 10-in. 0.1428; 12-in. 0.1730; 16-in. 0.3070.

Total reconditioning costs, including removing from ground, hauling, above wrapping costs, and replacement in ground (Does not include paving cost and overhead) are:

Per linear foot ($): 2-in. 0.838; 3-in. 0.9221; 4-in. 0.509; 6-in. 2.066; 8-in. 3.726; 10-in. 3.017; 12-in. ——; 16-in. 7.311.

(33) Cost of reconditioning various lengths of 12¾-in. pipe varying in length from 675 feet to 2,016 feet, were as follows:

Job	Kind of Coating	Labor Cost Per Ft., $ (Linear)	Material Cost per Ft., $	Paving Cost per Ft., $	Total Cost Per Ft., $
1	Cold paint	0.1182	0.0337	.....	0.1599
2	Grease	1.0117	0.3792	.....	1.3942
3	Grease	1.1498	0.3887	0.6833	2.2690
4	Grease	0.6951	0.2730	0.9616	1.9549
5	Grease	0.3520	0.2027	.....	0.6356
6	Double wrap, 3 coats enamel	0.8576	0.4499	.....	1.3752
7	Two coats coal tar and outer asbestos wrapper	0.6772	0.2542	.....	1.0109

Measuring Stray Current in Underground Cables

By C. M. Buck

Pacific Gas and Electric Co.

THOUSANDS of dollars are spent annually by the various utility companies to replace underground cables which have failed due to electrolysis pitting the lead sheath and allowing moisture to permeate the insulation.

Since many pipe owning companies are using electric pipe protection which causes current to flow in other underground structures including lead cable sheaths, and since many pipe owning companies also own electric underground distribution networks, a pipe protection electrolysis engineer is frequently called upon to test the lead cable sheaths.

If the value of current being discharged from or picked up by underground cable sheaths could be determined in advance, it would be possible to ascertain with reasonable accuracy whether dangerous electrolysis conditions existed. This information would then make it possible to take mitigative measures before a cable failure occurs.

This paper describes a method of measuring stray current in underground cable by means of the earth current meter, utilized by the Bureau of Tests and Inspection of the Pacific Gas and Electric Co. The method, although not infallible, is thought to give a more reliable indication of existing electrolysis conditions along a duct line than the usual potential measurements.

The principle of the McCollum earth current meter and its use on bare[1] and covered[2] pipe have been described in other papers. However, the constants of this instrument and its method of application, as developed for bare and covered pipe, cannot be used when testing underground cable placed in ducts.

The method of making electrolysis tests on underground cables described in this paper was developed after numerous tests were made using an experimental duct line located in the laboratory yard of the Pacific Gas and Electric Co.

(1) "Practical Applications of the Earth Current Meter"—by Burton McCollum and K. H. Logan—Bureau of Standards Paper 351.

(2) "Methods of Electrolysis Testing on Covered Pipe"—by T. C. Fronmuller (P.C.G.A. Proc. Vol. 25 (1934), p. 117).

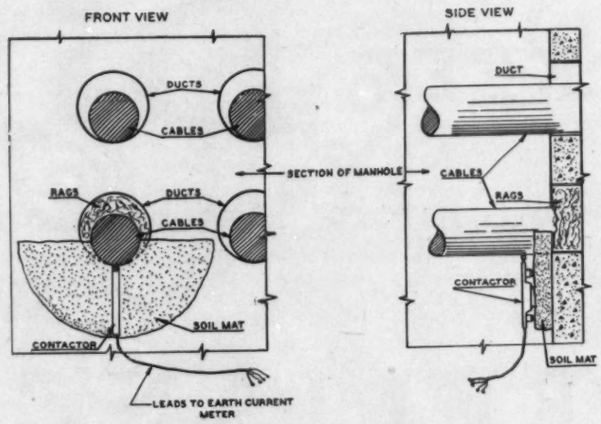


FIG. 1.

As it is impossible to take readings on the cable after it has entered the duct, it is necessary to obtain the current measurements in the various manholes along the duct line. This is accomplished by placing a damp soil mat around the cable surface to be tested, as shown in Fig. 1. The month of the duct in which the cable lies is first stopped up with rags. The rags are used to support the section of the soil mat which extends across the mouth of the duct.

The soil mat is made from soil to which has been added sufficient water to give it the consistency of fairly soft putty, so that it will adhere readily to the concrete wall and yet keep its shape. The soil is placed around the cable as uniformly as possible, care being taken to see that the mat makes good contact with the surface of the cable sheath. After the soil mat has been placed in position, at least 10 minutes should elapse before taking readings. This period of time is required to allow the lead to polarize. It requires several days for the lead sheath to become completely polarized; however, the polarization error is reduced to a low value in the time stated.

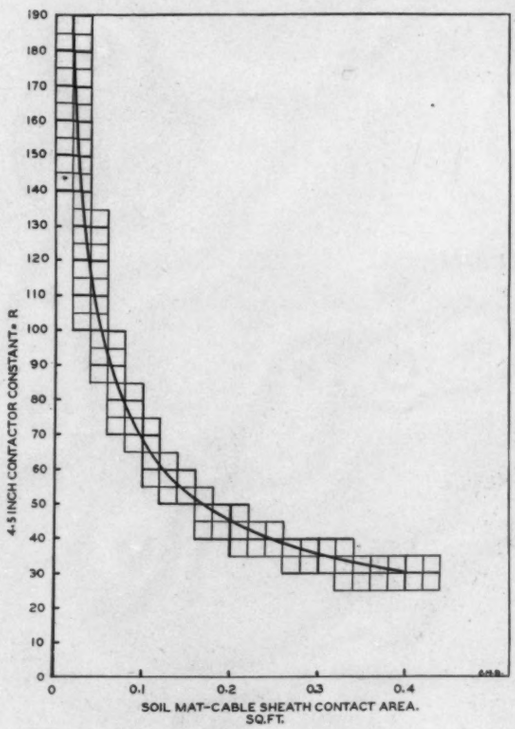
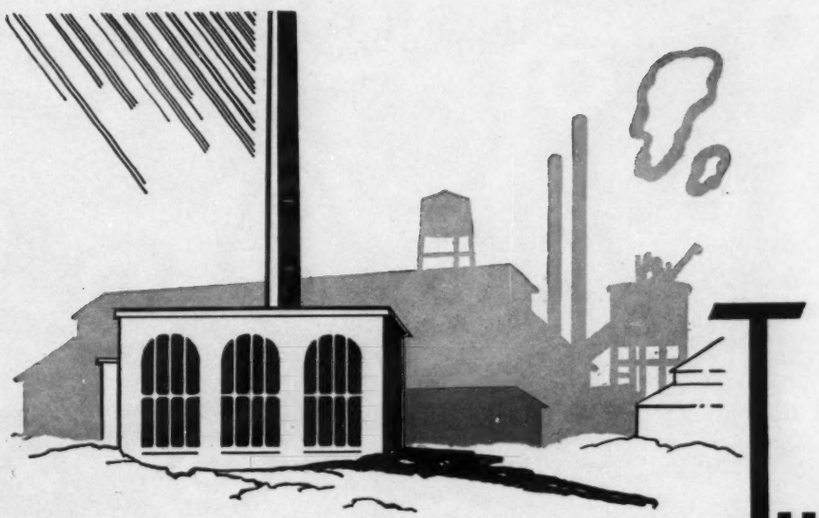


FIG. 2.



THE WECO PRECISION COMBUSTION CONTROL

(DRAFT COMPENSATING TYPE)

Some of the Salient Features of the Weco Combustion Control are:

1. Due to sensitive gas-air ratio control it makes it possible to obtain and maintain a higher CO_2 on burners than could formerly be had.
2. Maintains a constant CO_2 under any load conditions without CO within the following limits:

   50% of rating to max. rating $\pm$0.2% CO_2.
   Example—10.5% CO_2 desired; will hold between 10.3% and 10.7%.

   Below 50% rating $\pm$0.5%.

   Example—10.5% CO_2 desired; will hold between 10.0% and 11.0%.
3. Eliminates vibration at all times due to its maintaining constant gas-air ratio.
4. Maintains steam pressure within $\pm$1%. Can be adjusted for variation up to $\pm$7%.
5. Automatically compensates for varying draft conditions due to barometric or wind changes.
6. Automatically compensates for varying gas pressures.
7. Operates on any gas or steam pressure.
8. Can be equipped with any type of safety or limit devices.
9. It is simple to install.
10. It is simple to adjust—only one point of adjustment.
11. Flexible, due to the fact that there are twelve different types, either used with electrically operated gas valves, manual operated gas valves, gas operated gas valves, electrically operated damper device, hydraulic operated damper device, and manual operated damper device.
12. Diversity. This control is applicable to all types of atmospheric gas burners using either natural, induced, or forced draft. Also, where you now have a satisfactory operating damper operating mechanism, either hydraulic or electric, this control may be applied to this, thereby reducing cost.
13. Burners may be cut in or out without affecting adjustment of control.
14. Control complete with all accessories when received.

Each of these features is an important factor in the remarkable acceptance of the Weco Combustion Control.

THE WEBSTER ENGINEERING COMPANY

Tulsa, Oklahoma

Division of Surface Combustion Corporation—Sales and Engineering Service in Principal Cities

ALSO REPRESENTED BY

Natural Gas Equipment Co. Los Angeles and San Francisco
F. J. Evans Engineering Co. Birmingham, Ala.
Mechanical Equipment Co. Houston, Texas
Industrial Heating Co. Dallas, Texas

The diameter of the soil mat should be large enough so that its outer periphery extends 1 inch beyond the potential electrode adjacent to the lead end of the 4½-inch contactor when the contactor is placed radially to the cable as shown in Fig. 1. With the soil mat and contactor in this position, the current density at the surface of the cable sheath in contact with the soil can be measured, utilizing the earth current meter and using the following equation:

$$i = \frac{R\ E_e\ I_c}{E_c} \qquad (1)$$

where i = leakage current in milliamperes per sq. ft. of surface of cable sheath in contact with soil mat.
R = constant for leakage current at surface of cable sheath.
E_e = Voltage drop between potential electrodes due to leakage current (millivolts). When E_e is plus, current is flowing from cable sheath. When E_e is minus, current is flowing to cable sheath.
I_c = Current due to battery (milliamperes).
E_c = Voltage drop between potential electrodes due to battery current (millivolts).

As stated previously R as determined for bare and covered pipe cannot be used when testing cable. For this reason, it was necessary to determine values of R for cable surfaces, the value depending on the area of the cable sheath in contact with the soil mat.

R can be calculated by means of the following equation:

$$R = \frac{k}{A^{3/5}} \qquad (2)$$

Where k = 17
A = area of soil mat—cable sheath contact area in sq. ft.

However, for all practical purposes the curve shown in Fig. 2 can be used to determine values of R.

An example will show more clearly how to make use of the above equations.

The following readings were obtained with an earth current meter on a lead covered cable 2 inches in diameter. The soil mat used was 1 inch thick and contacted the total circumference of the cable sheath.

$$E_e = +39.8$$
$$I_c = 1.65$$
$$E_c = 370$$

$$A = \frac{2 \times 3.1416}{144} = .044 \text{ sq. ft.}$$

By the use of equation (2) R can be determined for A equal to .044 sq. ft. or reading directly from Fig. 2, the value of R is found to be 111.

Substituting the above values in equation (1), we have

$$i = \frac{111 \times 39.8 \times 1.65}{370} = 19.7 \text{ milliamperes per sq. ft.}$$

As the direction of E_e is plus, this indicates that 19.7 milliamperes per sq. ft. are being discharged from the cable sheath.

It is to be understood, of course, that the results obtained by the artificial electrolysis conditions set up in the manhole are not necessarily the true conditions as they exist inside the duct line. However, they give a reasonable indication of what is taking place at moist parts of the duct.

There are a number of variables which make it impossible to simulate the exact electrolysis conditions inside the duct. There may be very little moisture in the duct in which case the cable sheath to soil circuit would probably have a resistance sufficiently high so that there would be little or no current flow between the soil and the cable sheath. If this condition existed, the current density at the test location would be higher than in the duct. On the other hand, there may be considerable moisture in the duct due to cracks or poor joints, and a very small contact area between cable and duct which would increase the current density. If this were the existing condition then the current density at the test location in the manhole would be lower than in the duct.

Another source of error is the kind of soil used for the soil mat. Whenever possible the mat should be made from soil obtained near the test location and adjacent to the duct line.

Results of Trial Runs With Diesel Oil At Potrero Gas Plant

By J. F. DORAN
Pacific Gas and Electric Company

MUCH has been accomplished within the last few years in stand-by gas plants to produce gas that would perform equally well in all makes and types of gas installations. Diesel oil, now being used for making gas at the Pacific Gas and Electric Co.'s Potrero Plant, meets the requirements of the various appliances very satisfactorily.

J. F. Doran

Perhaps the greatest problem confronting the gas men on stand-by is how to get the generators up to gas making temperature within the shortest possible time. To those of us familiar with the improved Jones two shell generator it will be recalled that formerly from 8 to 10 hours were required to raise both shells to gas making temperature, thus presenting a serious problem during the winter months when, due to a serious break in the transmission line the plant might be called upon to take over all or part of the domestic load.

The first step in this direction was made by Frank Wills, engineer of production, by redesigning two of the Jones oil sets at Potrero. These generators were formerly designed to use a residuum and were very efficient with this high carbon oil. These sets (see Fig. 1) are 18 feet, 9 inches in diameter with a primary shell 49 feet high and a secondary shell 63 feet high, and had a capacity of 5½ million cubic feet per day. The primary shell was composed of a heat chamber or superheater for the introduction of steam during the make period. Below this heat or superheat chamber were eight courses of checkers supported by the primary arch, followed by the primary make chamber with 34 courses of checkers, then the throat piece connecting the primary

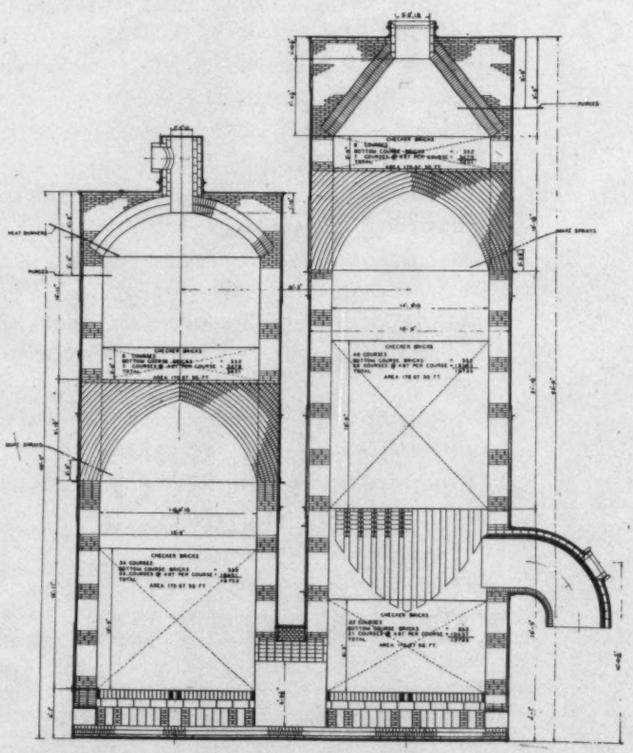


FIG. 1. An 18-ft. 9-in. oil gas generator as originally built.

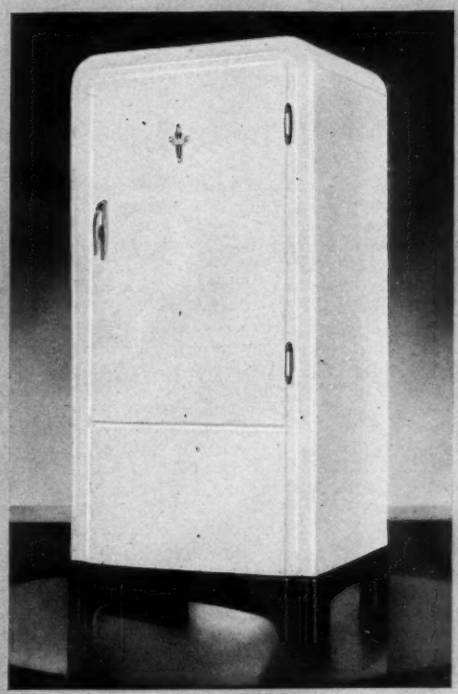
AUGUST
carries on the record-breaking REFRIGERATION SALES SUCCESS *of gas companies from coast to coast*

THE SUCCESS FORECAST by the *instant appeal* of the 1935 Electrolux is being confirmed and reconfirmed! During August, orders for gas refrigerators continued to mount throughout the country . . . easily maintained the fast sales pace set early this year.

Thanks to aggressive gas company cooperation—to intelligently directed sales strategy and forceful advertising—more and more families each month are discovering the greater efficiency, beauty and convenience which only Electrolux can offer.

Sales for the past half year give ample evidence of the ability of gas refrigeration to win out single-handed against the combined forces of competitive automatic refrigeration selling. In Southern California, for example, Electrolux has far outstripped all other makes of refrigerators. And, in other sections, similar records are rapidly being achieved.

To gas companies anxious to make sure that every refrigerator installed in their territory is a *gas* refrigerator, the months ahead offer an important opportunity. For today it is certain: *1935 is gas refrigeration's year!* Servel, Inc., Electrolux Refrigerator Sales Division, Evansville, Indiana.



NEW *Air-Cooled*

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THE SERVEL *Gas* REFRIGERATOR

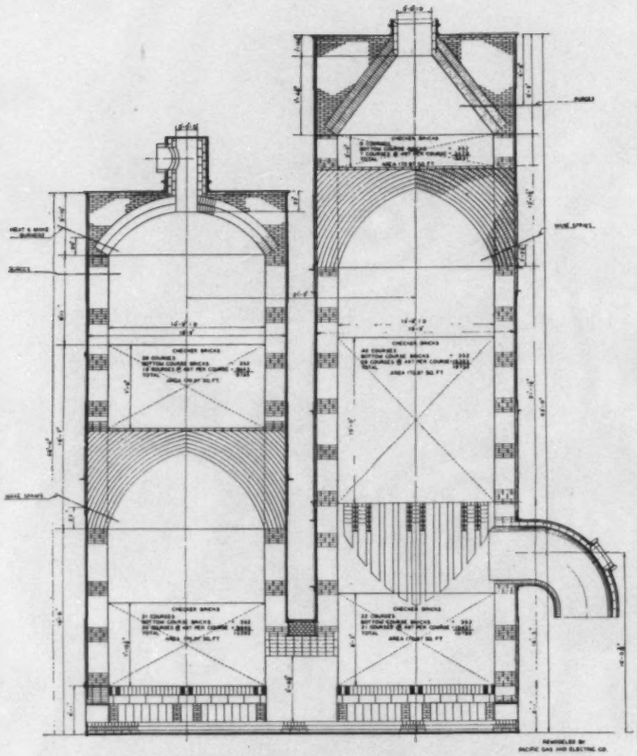

FIG. 2. An 18-ft. 9-in. generator re-bricked to include three chambers for manufacturing high B.t.u. gas.

with the secondary shell. A 2-inch line, connected at the throat piece, supplied steam for cooling purposes only, as very little carbon was formed at this point. The secondary shell has 22 courses of checkers at the bottom and above these the off take chamber, then immediately above, a supporting arch for 40 courses of checkers followed by the secondary make chamber and then another supporting arch for 8 courses of checkers, the superheat chamber, where steam was also introduced during the make period. By the introduction of steam in the two superheat chambers there was produced a gas with 12 to 14 per cent CO, this large percentage resulting from the high carbon content of the residuum and the high temperature (1800 degrees F. in the checkers) required to break the oil down to 550 B.t.u. gas. The free carbon produced amounted to about 12 to 14 lbs. per thousand. The amount of oil used in these generators per run was 250 gallons in the primary, 170 gallons in the secondary and 55 to 60 gallons of heating oil. The cycle was 8 minutes heating and 8 minutes making, with the heat period made up of 6 minutes heat and 2 minutes dry blast, the make period with 6 minutes make and a 2 minutes steam purge.

Diesel oil with an A.P.I. gravity of 33 degrees or 34 degrees consisting of much lighter hydrocarbons than the residuum requires a temperature of 1200 degrees to 1400 degrees F. (in the off take) to produce a gas of nearly twice the heating value of the former oil gas, and, as a consequence, little carbon is produced, a thin tar being the only by-product. The decomposition of steam is so much reduced, that its further use is necessary only for injection of oil.

With Diesel oil gas as stand-by, steam would still have to be used in the heat or superheat chamber of the primary at a rate of about 6 to 8 thousand pounds per hour during the greater part of the make period to control the high temperature at this point and prevent an over cracking of the gas made in the primary make chamber directly below. By utilizing the heat or superheat chamber as a make oil chamber, however, all of this steam can be saved and additional generator capacity attained. To accomplish this the following changes were made in the primary shell (see Fig. 2). The primary arch formerly supporting the 8 courses of checker brick was lowered approximately 5 feet, thereby increasing the number of courses above the arch to 21, and as a consequence decreasing the number of checker courses below this arch from 34 to 21, maintaining, however, the original number of courses in the primary shell. The necessary oil and steam piping for the additional make oil sprays was installed, by placing an ejector between every two of the heating ejectors located near the top of the primary shell.

Trial runs, made on the new design during January, 1935, showed that the upper primary chamber can use 450 gals. of Diesel oil without any superheater steam, and that the lower primary, (formerly the *only* primary make chamber) can use 210 gals. This small decrease in the lower primary is due to fewer checkers in that chamber and the greater distance from the heat chamber. It was evident that with a reasonable length of operating time the total oil gasified per run including that in the secondary make chamber would be increased to about 810 gallons. There is an additional advantage in that the lower make chamber in the primary is so near the throat that the temperature can be controlled by the amount of make oil used. The steam introduced at the throat in the older process amounted to 4,000 lbs. per hour; and its effect was only local in extent, about 8 sq. ft. of the lower primary, leaving the lower secondary to be cooled by excess air during the blowing. It will be noted that wherever in the new process, steam has been eliminated, that volume of steam can be replaced by a greater volume of gas produced. The better control of the temperatures at the throat makes it possible to speed up the heating slightly and improve the ability to maintain a constant, or quickly changing, quality of gas.

The speed with which the generators can be brought to full gas making temperature is a feature of the new process that is of inestimable value. In the older process the time was 8 to 10 hours. The heat of the blast was concentrated in the upper primary, and only after many runs, with deposition of carbon, and its subsequent burning during the blowing, could this heat be transferred to the lower primary. Now, with the heat chamber converted to a make chamber, 450 gals. of oil can be introduced during the second run. The former quantity was 50 gals. Instead of requiring 8 hours to reach full capacity, the time is now only 2 hours, provided the set has been kept warm with gas fuel.

Keeping a set warmed by gas is another development. It was introduced at San Rafael and later improved by M. A. Richford. Two gas burners are placed opposite through the secondary blast openings and a third in the throat at the bottom of the primary. Enough gas is burned to heat the secondary until the temperature at the stack reaches 1,000 degrees F.; then these burners are removed and with three others are spaced around hte primary at the level of the lower make sprays. These are adjusted with only a little primary air, and secondary air is introduced at the bottom of the primary, so adjusted in volume, that combustion is complete only when the flame extends into the secondary shell. By this method the generator can be brought from cold to stand-by temperature in about four days and a good operating temperature can be maintained through both shells. A minimum time is therefore required to place the machine in operation when the occasion demands.

In conclusion it is safe to say that the modified generator is satisfactory for producing high B.t.u. oil gas for emergencies. The utilization of more space for gasifying oil, the elimination of most of the steam, and the shortening of the cycle have increased the daily capacity of the sets by about 60 per cent.

Training of Service Men*

BEFORE the study of gas service employee training was commenced by this committee, it was necessary to secure accurate information concerning present educational practices employed by member companies of the Association. To accomplish this a questionnaire was designed for general distribution among the various companies.

Of 19 companes receiving the questionnaires, nine returned complete reports; seven were not engaged in an educational program and three companies failed to reply. Those utilities not following a definite plan were poorly adapted to organized training, either because of a small service force or a widely spread system, or both. It was evident, however, that a general widespread interest in job training prevailed, whether of the organized variety or the less conventional types. A summary of the answers received presents a fairly clear picture of employee training programs now being carried out by the different gas companies on the Pacific Coast. This was the starting point of the committee's study.

The better educational practices were next considered, and where they appeared to possess flexibility and merit enough for general application, they were offered in the form of recommendations. Thus, the committee's report is in the nature of a composite picture, the component parts of which are the outstanding features of the several programs studied. Answers to the questionnaires are summarized in Table No. 1.

*Committee Report: R. C. Terradell, L. A. G. & E. Corp., Chairman; O. F. Anderson, Coast Counties G. & E. Co.; R. V. Davis, L. A. G. & E. Corp.; H. A. Johnstone, So. Calif. Gas Co.; J. N. Young, P. G. & E. Co.

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PORCELAIN ENAMEL *THE Lifetime Finish*

TABLE NO. 1.

	Company Key									Totals
	A	B	C	D	E	F	G	H	I	
All service men are given identical training	x		x	x	x	x	x	x	x	8
Field training	x	x			x	x	x	x	x	7
Lectures	x	x	x	x	x	x		x	x	8
Laboratory	x	x		x	x	x		x	x	7
Are any (all) training courses repeated at regular intervals?	x	x	x	x	x	x		x		7
Type instructor employed for service men training										
Regular employees proficient in customer contact service work	x	x	x	x	x	x	x	x	x	9
Company employees especially trained as instructors	x					x				2
Outside										0
Service men are instructed on their own time		x		x		x		x	x	5
Courses of instruction offered										
Ranges	x	x	x	x	x	x		x	x	8
Space Heating	x	x	x	x		x		x	x	7
Water Heating		x	x	x	x	x		x	x	7
Electrolux	x	x		x	x	x			x	6
High Bill Investigation	x		x					x	x	4
Public Contact			x			x		x	x	4
Sales	x					x		x	x	4
Cooking	x					x				2
Meter Turn On and Close					x					1
Emergency					x					1
Appliance Servicing						x				1
Type of examination employed										
Written	x					x				2
Oral								x		1
Both			x		x				x	3
None		x		x			x			3
Benefit Indications—Yes	x	x		x		x				4

Recommendations

Wide differences existing in the character of the various service problems confronting the member companies of the Pacific Coast Gas Association make it illogical to recommend a definite program for the training of consumer service men in the subjects considered in this report. It is possible, however, to recommend educational training courses for further investigation and some of the objects to be attained.

1. High Bill Investigations
   (a) To standardize on a uniform procedure.
   (b) To disseminate all available knowledge concerning this type of order and its solution to all employees in constant contact with consumers.
   (c) To reduce total number of High Bill Complaints received as such.
   (d) To reduce the unit cost of the order.
   (e) To improve public relations.
2. Load Building and Load Retention
   (a) To place American Gas Association approved appliances on the lines, resulting in efficient, trouble free service, thus reducing the number of service complaint orders received.
   (b) To improve public relations.
3. Cooking
   (a) To permit the consumer service men to understand the modern gas range from the customer's viewpoint.
   (b) To eliminate unnecessary and promote necessary calls by the Home Economist.
   (c) To improve public relations.
4. Public Relations:
   Training in public relations can be incorporated in the educational courses aforementioned without necessitating the use of a specialized course for this subject.

MECHANICAL TRAINING

While the selling of modern gas appliances is very important to the gas industry, keeping them sold is even more vital. One of the essential factors in accomplishing this is a staff of well trained customer service men.

A few years ago gas appliances were so simple, job training was seldom given very serious thought. Frequently the only training a service man received, aside from that which he got on the job, was from appliance salesmen, who usually gave a good sales talk concerning their own particular make of appliance. No reference was made to any weaknesses of their product, and as a result, the service man pioneered many adjustments by the trial and error method. The result was a poor grade of service to the customer, mounting costs to the utility, and a bad reputation for gas fuel.

Today's threat of substitute service has quickened the tempo: The gas industry met the challenge with refinements in both design and construction of the gas appliance. Many new services are now rendered by gas, which, coupled with the older utilization fields, makes greater demands on the customer service man. Logically, then, by keeping pace with developments, the modern service man has undergone virtually as many changes as the appliances themselves. He must have a thorough knowledge of refrigeration, space and water heating equipment. Other domestic automatic appliances, and the commercial and industrial installations must be simple in his eyes. This requires training. To learn what training is being done currently among member companies, questionnaires were sent out, and the replies received form the basis of this paper.

In general, practically all the smaller companies are training service men by individual field instruction, supplemented by small conference groups conducted by the superintendent or manager. Eight companies have instituted regular mechanical training courses, and their answers to the questionnaire disclosed the following:

(1) Six companies have appliance laboratories with appliance set-ups, thermostats, regulators, valves, etc., available for study purposes.

(2) Six have new employees accompany fully trained employees on their routes for a part of their training.

(3) Seven have lectures as a part of the training course.

(4) Systematic training has been used for service men for different lengths of time as follows:

One company —one year
Two companies—two years
One company —five years
One company —ten years
One company —fifteen years
One company —no answer

(5) Three repeat the courses at regular intervals; five do not.

(6) Seven companies develop the courses of instruction within their own company. Four have had some classes developed by the American Gas Association.

(7) One company has no set course of instruction.

In general, all other companies select the courses to meet specific needs—either to overcome marked mechanical deficiencies, to meet certain local requirements, to stimulate interest in the business, or to better combat competition by rendering a higher type of service on those appliances which are threatened.

(8) All companies utilize employees, who are generally proficient in the work, as instructors for new men.

Five of the eight companies replying, do not utilize employees exclusively trained for any one phase of the work; three do. The latter companies have their mechanical training given under the supervision of a director who is responsible for the routine of the courses and their application.

(9) Five of the eight companies instruct employees on their own time because of the operative economy in so doing. Three of the companies educate on company time because of its effectiveness in producing better results; viz., they can demand attendance and application.

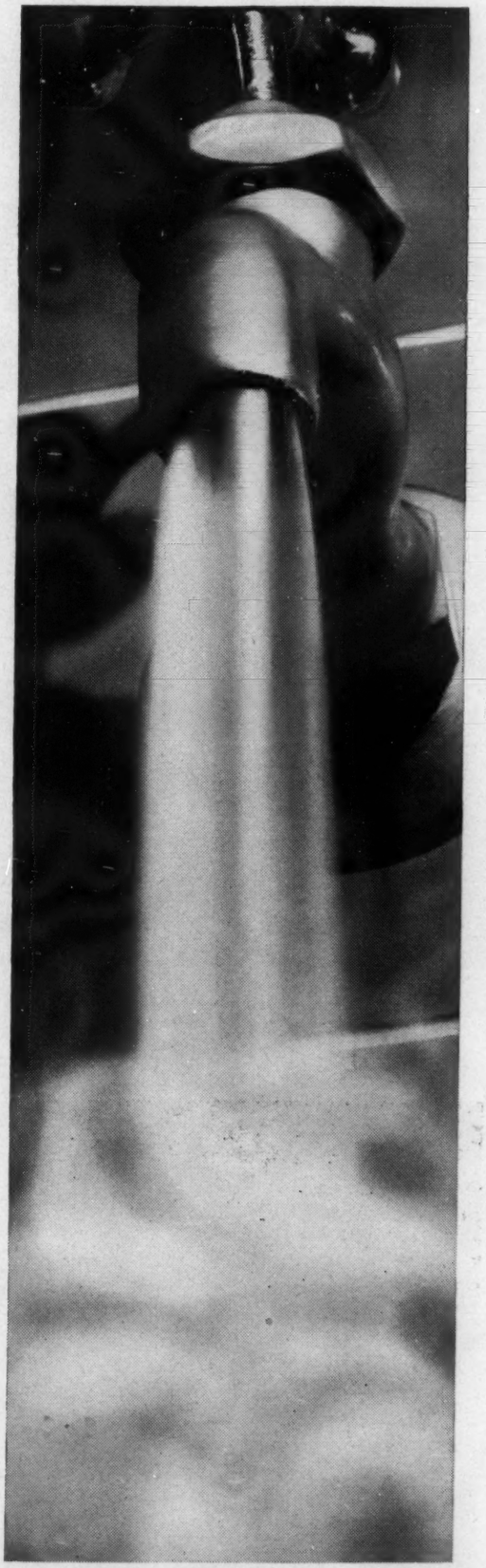
In consideration of general thought on the subject of employee mechanical training, two methods stand out as possessing merit for the larger service groups:

I. Field Method

Assuming that the student should first gain field experience as a helper before laboratory appliance work is begun, this plan of intensive field instruction for customer service men is definitely outlined from his date of employment up until his first solo job: Observing a definite schedule from beginning to end, the student must be allowed enough time on each class of work to become entirely familiar with it before taking up any other phase of service.

With this in mind, the outline of field instruction shown in Table No. 2 will give the student more comprehensive training and a clearer picture of the service rendered by the company which employs him. Each type of instruction is listed below with the corresponding number of days the student spends on that work. The different instructors are designated by numbers.

At the end of each training period, the service man, acting as field instructor, notifies the student to report to the next-service-man-instructor on the list noted above, the following day. Then the instructor forwards a field report (see Fig. 1) to the training



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Purchasers of automatic water heaters want rust-free hot water, and plenty of it... not for just a few years, but indefinitely. And only a tank that *cannot* rust will satisfy this requirement.

Everdur ... the ideal metal for tanks ... is nearly all copper, made as strong and tough as steel by a special alloying process. Yet it is immune to rust. Since it welds as readily as steel, Everdur makes possible the *economical* production of non-rust tanks by welding—the sturdiest type of construction employed by tank makers. In addition to its great strength and corrosion resistance, Everdur is highly ductile—a combination of properties which enables Everdur tanks to undergo successfully the most drastic tests.

And Everdur tanks are time-tried. Thousands of them... ranging in size from one to 20,000 gallons capacity... are in various types of service. Leading makers of automatic gas water heaters standardize on Everdur for rust-proof models. This quality equipment, by providing rust-free, trouble-free service, offers the public long life at low cost.

ANACONDA
from mine to consumer

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"Everdur" is a registered trade-mark identifying products of The American Brass Company, made from alloys of copper, silicon and other elements.

THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Connecticut
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EVERDUR METAL *for* TANKS

RUSTLESS AS COPPER... STRONG AS STEEL

TABLE NO. 2

Type of Instruction	Instructors	Total Man Days of Field Training
Meter Sets	1	5
	2	5
	3	5
	4	5
Traces	5	2
Locks	6	2
Apartments	7	10
	8	10
Turn-ons and Closes	9	5
	10	5
	11	5
Emergency	12	5
	13	5
Electrolux	14	5
Restaurant Adjustments	15	3
	16	3
Specialty Work	17	5
	18	5

supervisor, based on his personal observations of the student. This report accomplishes several things:

(1) Its requirements remind the field instructor of specific training to be given the student.

(2) It affords 18 separate opinions of the student's value and potential worth. (Note the number of different instructors above.)

(3) It keeps the supervisors informed of the student's whereabouts.

(4) It makes possible a definite, predetermined amount of training for each man.

(5) An accurate cost of each man's training can be kept.

(6) A student's weaknesses can be observed and corrected by the supervisor as training progresses.

(7) Such a system of training, with its running audit, reduces the possibility of retaining a new man with undesirable qualities.

(8) Old employees can be injected into the "machine" at any point desired.

FIELD REPORT

Mr. _____'s Field Training in _____

procedure for _____ working days from _____, 1935, to _____, 1935

based on my personal observations during this period.

	Poor	Fair	Good	Exc.	Superior
1. Appearance					
2. Alertness					
3. Industry					
4. Cooperation					
5. Tact					
6. Order routine					
7. Personal qualities					
8. Physical qualities					
9. Consumer contact					
10. Knowledge of work					
(a) Range					
(b) Water heater					
(c) Space heating					
(d) Electrolux					
(e) General					
11. Maintenance of Equipment					
12. Safety practices					
13. Potential value in this work					

Remarks:

Signed: _____
Instructor

FIG. 1.

II. "Laboratory" or Shop Method

The laboratory or shop method of mechanical training, supplementary to field mechanical training, may be organized to advantage as follows:

Arranging the Courses: A Curriculum Committee, the members of which are selected from various service branches, prepare the courses. This method insures more complete treatment of any subject. Besides deciding on the material to be included in each course, the committee determines the extent of each lesson, and the number of hours necessary to complete the course. American Gas Association Manuals should supplement the material offered.

An educational director heads this committee, and besides supervising the actual training given, he acts in the capacity of editor and consultant.

Mechanical Training Facilities: Besides a well ventilated and lighted lecture room, equipped with adequate blackboard space and a raised platform, there should also be provided a completely equipped laboratory. Here, appliances should be connected, so that they may be easily demonstrated and adjusted (Fig. 2). Portable or stationary boards may be used to mount cut-away thermostats, valves, safety pilots and other control parts (Fig. 3). A demon-

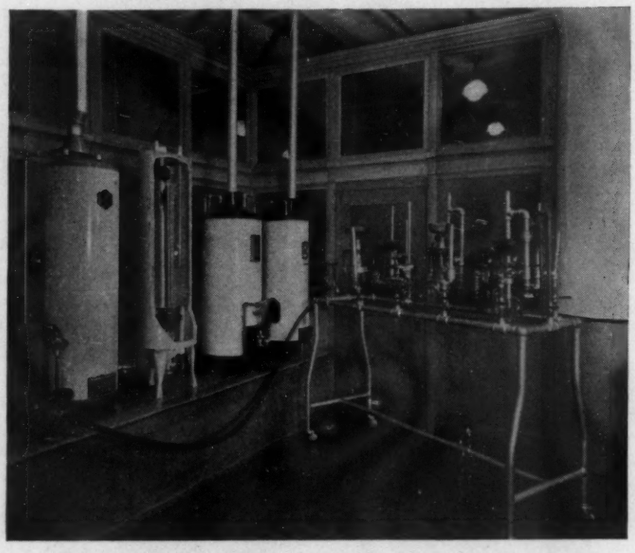

FIG. 2. Water heater burners mounted on portable rack, with hose connection for demonstration.

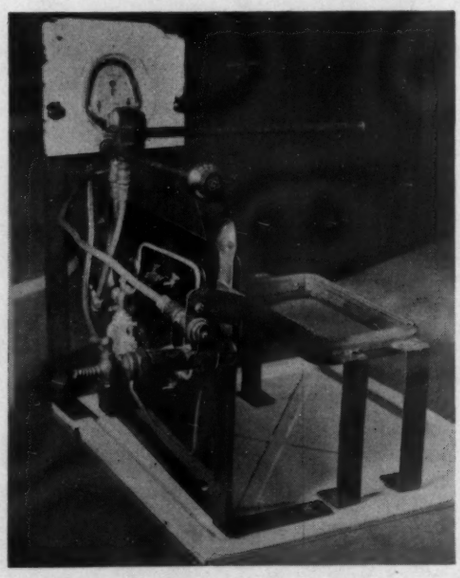

FIG. 3. Working parts of a clock-controlled range assembled in a portable unit for demonstration.

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They Promote Volume with Profit

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These latest Detroit Jewel and Garland ranges embody all the features that have met with widespread approval everywhere. Built to fit 36 inches of floor space, they are really big gas ranges in every detail.

Possessing all the structural features of our famous junior line, such as the one-piece oven (20 inches deep) with rounded corners, removable oven tray, and many others, these ranges can be retailed at a price that is amazingly low for products of such quality.

Made in three color trims: plain white, ivory and tan, and ivory and green.

A New Garland

Detroit - Michigan Stove Company

DETROIT, MICHIGAN

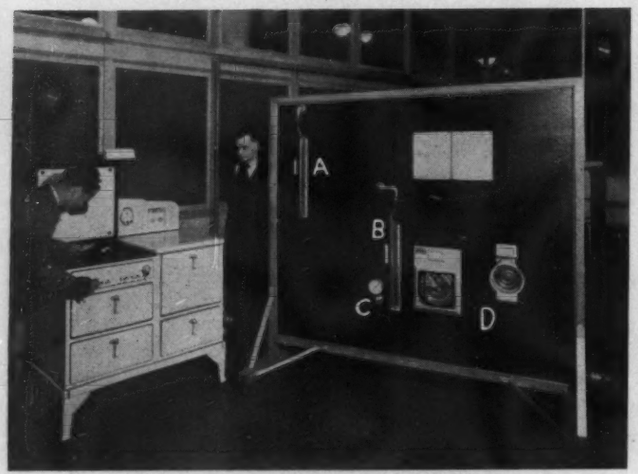


FIG. 4. Front view of a demonstration board in operation.

A. Water column gauge showing pressure at appliance.

B. Water column gauge showing pressure between regulator and meter.

C. High pressure gauge showing pressure between service line and regulator.

D. One tin meter and one iron cased meter, each fitted with glass sides to show operation of working parts.

stration board (Fig. 4), through which the gas supply is controlled to any desired appliance, is desirable to illustrate the effect of excessively high or low pressures, undersized or trapped houselines, etc.

The Instructor: The instructor's qualifications are of greatest importance to the success of any training given. He must be patient, understanding, and have the confidence of the students. This student acceptance determines to a large degree the amount of resistance offered up against his efforts. In short, the selection of an instructor involves intangibles of greater consequence to a training program than his knowledge of product. He must inspire, encourage, discern weaknesses and correct them, employ a sense of humor without humoring, be interesting but not entertaining.

Lectures: The lecture part of a mechanical training course should be given by the same instructor who conducts the "laboratory" or shop work. This is important, since he will then be in a position to know what has been covered during the course. In addition, by studying the character of discussion, he is enabled to drive home certain essential points through subsequent laboratory demonstrations.

Attendance: While the laboratory attendance should be confined to not more than 10 men in the group, the lectures may include larger groups. The limit of attendance should be set below the point where the group gets unwieldy from the standpoint of discussion. Two, or not more than three, laboratory groups can be accommodated in the lecture sessions, during which the groundwork is laid for future laboratory verification of what was delivered.

When possible, it is desirable to include the immediate supervisors of the field men in mechanical training courses. By so doing, the supervisor not only is kept better informed on the subject of appliance servicing for which he is responsible, but he can supervise the field man's education in this way:

(1) He can call the instructor's attention to certain prevalent weaknesses in the men either as a group, or as individuals.

(2) He knows what his men have been taught, and should know.

(3) He can introduce a subject which he feels has not been stressed sufficiently, or possibly hasn't been brought up at all.

(4) His presence will have a good effect on the men, who will feel more obligated to assimilate the information made available.

Class Rosters: When making up groups for instruction, several means may be employed to advantage in an attempt to avoid unwarranted repetition of subject matter:

(1) Consultation of former rosters.

(2) Questionnaires to all service men asking them to check the mechanical training desired.

(3) Recommendation of supervisors.

(4) Elapsed time since last training was given.

(5) A check of material on former lectures to note gas appliance developments since then.

Classroom Sessions: The length of the various courses given depends entirely on the amount of material to be covered. The frequency and length of meetings, however, may be arranged to better advantage on definite schedules, dependent upon what subject matter is treated. Lectures on the various subjects should not exceed one hour, while the laboratory work can be better given during a two-hour period, immediately following the lecture. Longer periods tend to produce restlessness on the part of the students. By following such a group schedule for successive days, the continuity of thought on the subject is better preserved.

Some companies recommend holding the classes once each week to enable the students to study and also to use the material in the field. Although this has definite advantages, it is offset by necessary additional time for review each week; lowered class interest resulting from repetition of somewhat, or very, familiar material; too long a period of time to complete the course. The latter reason is advanced, because if service men are known to need certain training, it is very much to a company's advantage to give this training in the briefest space of time that other operations will permit, thus getting immediate returns in better service.

Laboratory Equipment: A *completely* equipped laboratory is of inestimable value in presenting mechanical training courses. Included, should be every common type of appliance of every class. Cut-away models of every control exhibited is an ideal well worth striving to attain.

In the larger companies, each outlying district should have a skeleton display of the main laboratory, which, through a rotating schedule, is replaced at regular intervals by a different skeleton display from another district. To accomplish this, it would only be necessary to duplicate the main display; break it up into the number of units desired; place a different display in each district headquarters, and start the rotation when each has served its purpose. It has been found that one make of appliance can satisfactorily serve for more than one kind, or make, of appliance using the same control.

Use of Laboratory: It is not advisable to have more than two men work on any appliance at the same time, since one interferes with the other, due to the small size of the subject. Two men can work profitably on the average size range, but on water heaters and space heaters, one man in preferable. The Electrolux can be studied by either one or two men at the instructor's discretion.

When classes are not in session, the exhibit should be open to any employee desiring admittance. Any display of interest by employees must be encouraged. For this reason, all laboratories should be located in an easily accessible section of the plant.

Examinations: Examinations, featuring manipulation, should be held at the end of each course. This practice promotes classroom interest and the results will be indicative of what amount of material was absorbed. The examination questions should be taken from the service records of the mistakes made most frequently by the men, salient points of the course, and weaknesses of the group disclosed by reviews held prior to examination.

The use of examination data is urged for these reasons:

(1) The instructor is made familiar with those points to be stressed in future similar groups.

(2) The students are aware of their own weaknesses, if they are graded on the results of the examination, and in the majority of cases attempt to correct such weaknesses.

(3) Such data are valuable adjuncts to personnel studies.

(4) Examination results are a fair reflection of the quality service rendered the consumer. This information, supplemented by routine field checks, enables the operating division to strengthen certain practices where desired.

Whether the data compiled from examination results are used, the good will have been accomplished the instant a student finishes. His efforts to prepare himself for the examination, and his concentration on the subjects involved during the test, unquestionably improved his knowledge of appliances, and this was the object in view when he was enrolled.

FIELD EQUIPMENT FOR SERVICE MEN

Tool equipment listed in Table No. 3 is considered minimum for the modern, well equipped customer service man.

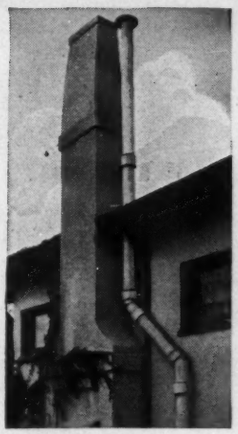
The servicing of present day modern gas appliances with their multiplicity of controls, concealed valves and variety of construction require a far larger assortment of tools and special equipment than was required a decade ago.

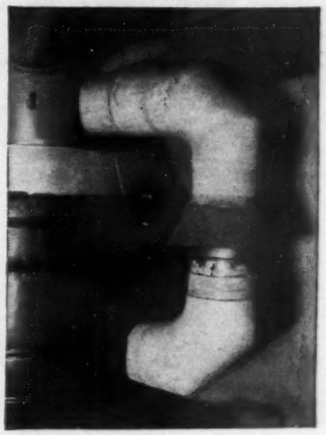
Wouldn't you rather use this permanent Flue Pipe?

. . . and by "permanent," we mean non-corrodible . . . absolutely weatherproof. (Cost, incidentally, is surprisingly *low*.)

A GOOD salesman can sell the home owner on gas heating. But to *keep* him sold, you've got to provide appliances and equipment that are thoroughly dependable.

Right now you can put one item of equipment squarely in the trouble-proof, maintenance-free class. You can end the repair and replacement of corroded flue pipes and chimney linings. J-M Transite Flue Pipe outlasts the gas furnace itself.





(left) **Absolutely weatherproof (it's made of asbestos fibre and Portland cement), J-M Transite Flue Pipe has solved the venting problem in thousands of Pacific Coast homes where flue pipe is usually installed outdoors.**

(right) **Rear view of gas-fired furnace vented by J-M Transite Flue Pipe. (Front view shown in photograph at top of page.) Transite Flue Pipe is quickly and easily installed; a full line of fittings is available.**

In to Stay

Transite Flue Pipe, made of asbestos fibre and Portland cement, is remarkably resistant to corrosive fumes and condensates. It is permanent. Absolutely weatherproof. On either indoor or outdoor jobs, you install it and forget it.

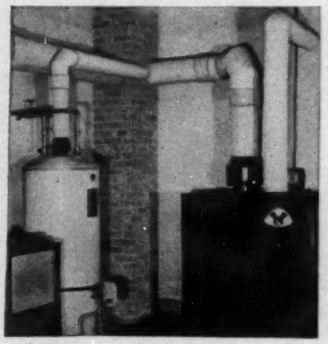
Because of its relatively low heat conductivity, J-M Transite Flue Pipe keeps stack temperatures at a high level for longer distances, minimizing condensation in the flue. And, like all asbestos products, it is unusually resistant to high temperatures.

J-M Flue Pipe is supplied in both round and oval form, in various capacities. And a full line of fittings is available.

Cost, considering its obvious superiority, is surprisingly low. Installation, quick and easy.

And it's approved by the National Board of Fire Underwriters.

Specifications and complete information in regard to installation methods, including the use of Transite for chimney linings, are given in our new brochure. Let us mail you a copy. Use the coupon.



Gas-fired water heaters and boilers are safely vented with Transite Flue Pipe. It carries the approval of the National Board of Fire Underwriters.

JOHNS-MANVILLE, 22 East 40th Street, New York City
Send me a copy of the Transite Flue Pipe brochure, and details on lining existing chimneys with Transite.

Name_____

Address_____

City_____ State_____

WG-9-35

The metamorphosis of gas appliances has brought about one of two conditions: Either the service man is burdened with a cumbersome assortment of devices, gadgets and conventional tools, many of which are interchangeable—or he goes into the field ill-equipped to complete a job with dispatch or to complete it at all.

This condition has prompted an investigation of field equipment used by customer service men in various member companies.

Through inspection, comparison and discussion of regular and special appliance servicing tools, the following list is submitted with the realization that some localities will require modifications to meet their special problem.

TABLE NO. 3. RECOMMENDED TOOLS FOR SERVICE MEN

1—Steel tool chest
1—Aluminum order holder
1—15-in. Manometer with hose
1—8-in. Pipe wrench
1—10-in. Pipe wrench
1—14-in. Pipe wrench
1—18-in. Pipe wrench
1—4-in. Crescent wrench
1—6-in. Crescent wrench
1—8-in. Crescent wrench
1—½ in. x 9/16 in. x 8 in. thin open-end double-end wrench
1—⅜ in. x 7/16 in. x 8 in. thin open-end double-end wrench
1—5/16 in. x 13/32 in. x 8 in. thin open-end double-end wrench
(Above end wrenches to be used in adjusting top burners on new model ranges with panel which covers mixing chambers and orifices.)
1—2-oz. Ball pein hammer
1—8-oz. Ball pein hammer
1—Pair long thin nose 7-in. pliers (Crescent No. 1027)
1—Screw driver. 1—¾-in. blade (Hurwood Machinist No. 51)
(Above screw driver to be used primarily for screws on mixing chamber of water heaters which are inaccessible with screw driver with long blade.)
1—Screw driver. 4-in. long blade (Stanley Hurwood No. 20)
1—Screw driver. 5½-in. long blade (Crescent Cabinet No. K-505½)
(Above screw driver is thin blade without flare. Used for reaching air mixer through small holes in panel.)
1—Offset screw driver
1—Screw driver (Small 3-in-1 type)
1—Flashlight
1—8-in. Flat mill file (Second cut)
1—6-in. 3-cornered file
(Above file for touching up battered threads.)
1—Ignition point file
(Above file to be used for touching up points on coils of spark-ignited floor furnaces.)
1—Small cold chisel
1—4-in. Prick punch
1—Adjusting key for 1-G Reliance regulator
1—Pocket water thermometer—0 to 220 degrees
1—Sealing iron
(To be used for sealing adjustments on regulators.)
*1—Special socket wrench
(To be used for removing fixed orifices on ranges.)
*3—Wooden reamer handles
*4—No. 31 burner broaches
*2—Industrial orifice reamers
2—Large orifice reamers
*2—Medium orifice reamers
*2—Small orifice reamers
*1—No. 3 special safety anvil with Rutz lighter die
*1—Adaptor crimping tool
*1—¼ in. x 28 in. tap (For installing No. 8 plug orifices.)
*1—17/64 in. x 36 in. tap
(For installing No. 1 plug orifices.)
1—"T" Handle tap wrench for above taps
2—MT Drills No. 34 (Burner Ports)
2—MT Drills No. 46 (25,000 B.t.u. per hour)
2—MT Drills No. 56 (9,000 B.t.u. per hour)
2—MT Drills No. 65
2—MT Drills No. 68
2—MT Drills No. 70
2—MT Drills No. 72
1—Pin vise for drills Nos. 66 to 72
1—Small hand drill (To be used for drilling burner ports.)
1—No. 1 Ezy-Out
(To be used for removing small screws or bolts which have been broken off.)
1—Oil can
1—Putty knife for removing excess grease from range burners
1—Wire brush
2—Burner swab brushes

*Equipment from Anderson & Forrester Co., Denver, Colo.

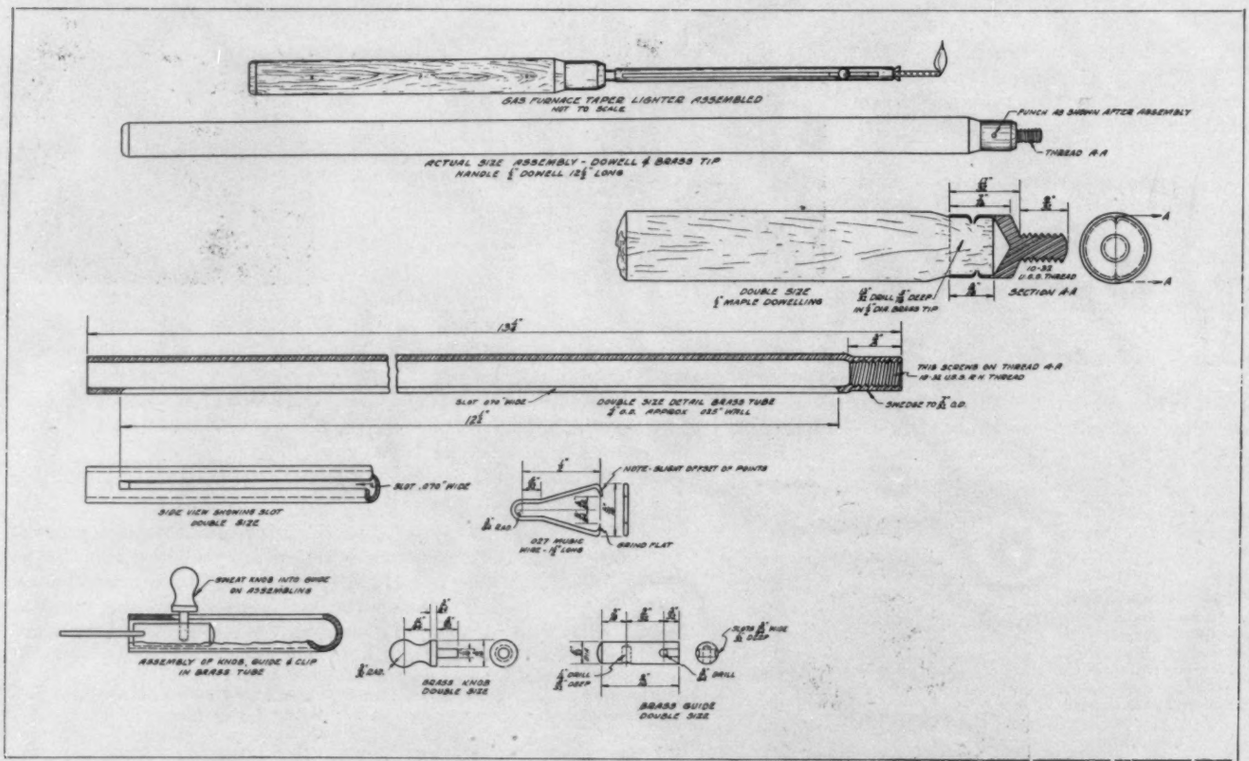


FIG. 5. Details for gas furnace taper lighter.

WARD Goes Places!

Unfilled orders . . . 300% ahead of last year!

Wholesale shipments . . 275% greater than 1934!

Steel purchased . . . three times that of last year!

Factory personnel . . . larger than at any time in the last five years!

Yes, sir . . . WARD is going places! Sales are up and steadily climbing. Orders coming from all over indicate that dealers and gas companies that are aggressive merchandisers are stocking WARD Floor Furnaces now for fall and winter sales. • WARDS are a quality product. Built of 16 and 18 gauge Toncan iron. Guaranteed ten years, made for a lifetime. Easily installed . . . an ordinary gas fitter can do all the work in less than a day. Exclusive features are strong talking points . . . Bilt-in *Thermo-Control* which regulates heat as desired . . . *Cradle Circulation* which air-conditions, increasing furnace efficiency 20% . . . *Automatic Pilot* which is a perfect safety device. • Every WARD Floor Furnace you sell adds to your good will and *helps build your load.* • Write or wire today for prices and other details.

A. G. A. APPROVED

WARD

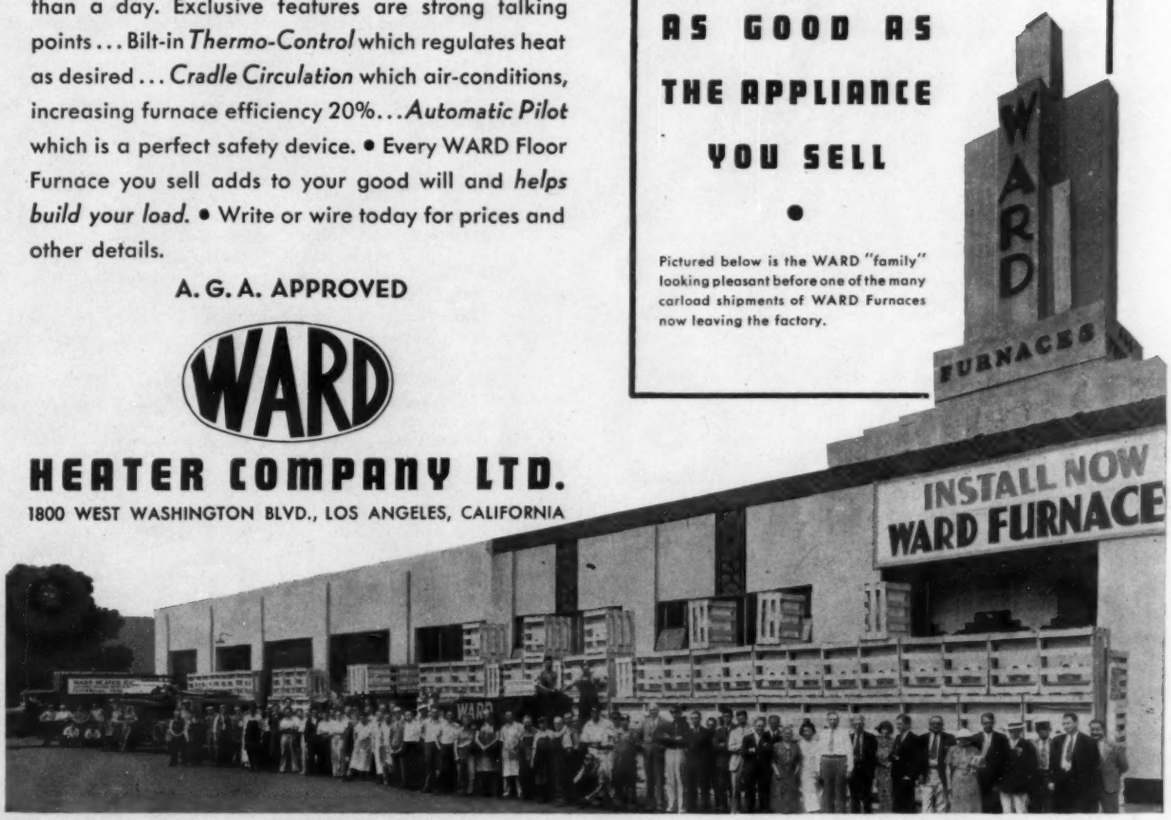
HEATER COMPANY LTD.

1800 WEST WASHINGTON BLVD., LOS ANGELES, CALIFORNIA

YOUR LOAD IS AS GOOD AS THE APPLIANCE YOU SELL

•

Pictured below is the WARD "family" looking pleasant before one of the many carload shipments of WARD Furnaces now leaving the factory.



1—"Handee" dope can (E. A. Key Co.—with combination cap and brush)
1—Soap can and brush
1—¾-in. Type "OA" safety service stopper
1—3 ft. x 3 ft. Piece canvas
(To be used to lay out tools on customer's floor.)
1—Wax taper lighter
(To be used for lighting furnaces. See Fig. 5.)
1—Muslin bag
(To be used when blowing services to catch rust.)
1—Short piece of "Laboratory Tubing"
(Used for blowing out lint in mixing tube of Humphrey Radiantfire.)
1—Can gas cock grease
Assortment of orifices
Parker vent pipe screws
Washers for meter connections
1—Watch with second hand to be furnished by employee
1—A.G.A. "Range Manual"
1—A.G.A. "Water Heater Manual"
1—A.G.A. "List of Approved Appliances"

OPTIONAL EQUIPMENT

1 Set Stock and Dies, ¼ in. to 1 in., inclusive
1—Reed ratchet reamer
1—Pipe cutter
1—Hack saw
1—Small tin snips
1—Oven thermometer in case
1—Ripping claw hammer
1—Pencil thermometer—0-120 degrees to be used for Electrolux
1—Drill gauge (Starrett No. 186)
1—Drill gauge (Starrett No. 286)
1—Small can iron cement for repairing two-piece burners
1—Pipe vise mounted on truck
1—Mechanic's vise mounted on truck
1—First aid kit

HIGH BILL COMPLAINT PROCEDURE*

Introduction

In compiling this Manual on High Bill Classifications and Procedures, information was utilized from trade journals, Distribution Department Standard Practice Manual, and the California Railroad Commission General Order No. 58.

Suggestions and data received from the Gas Distribution Department personnel, especially those enrolled in the classes, have been incorporated, and will be augmented by other suggestions from time to time.

Employees whose contacts with our customers are largely concerned with high bill complaints and various matters of a financial nature, occupy key positions from a public relations standpoint, because to a surprising degree, a customer's reaction to the service he receives is tempered by the size of his pocketbook. As this period of economic stress lengthens, those of us who are engaged in passing judgment on the justification of high bill complaints find the task increasingly difficult. This is not only because of a more intolerant public attitude begot of their general economic reverses but also because certain political and other social influences have been exerted against privately owned distributors of commodities, of which you are a representative.

An attempt has been made to correlate and set up many of the practices noted for their success, and group, where possible, those cases which require similar treatment. This material represents only the first step; other equally important phases of this work which cannot be taught are Patience, Tolerance, and Tact, without which you only arouse suspicion, anger, and dissatisfaction in the consumer's mind.

There can only be one solution to the high bill investigation and that is the one which leaves the customer firm in the belief you have drawn a fair and equitable conclusion in his individual problem.

However this may be accomplished lies in the separate treatment of each investigation, using the various methods and materials which you will have at hand for this purpose on completion of this course.

The object of the Manual is to aid in the solution of consumers' difficulties and misunderstandings concerning the cost of modern gas service. It is a tool which, if correctly applied, will aid in convincing consumers of our familiarity with our business and our interest in their problems.

*Excerpts from Manual on High Bill Investigations prepared by R. V. Davis for Los Angeles Gas and Electric Corp.

Procedure on High Bill Complaint Investigations

1. Read meter and test meter connections for leaks before entering house.

2. Check pilot light consumption before closing pilot; if excessive, note consumption on Better Service Order.

3. Test regulator.

4. Complete leak test.

5. Change the meter only if it is thought to be inaccurate, or if consumer will never be satisfied with it.

6. Check water heater carefully.

(a) Maximum water temperature should be between 130 degrees and 150 degrees on thermo-storage heaters in single story house, and not over 160 degrees F. in a larger house or apartment house. Higher temperatures increase scale in the coils and cause high bills.

(b) Flame should not go into vent on water heater.

(c) If thermo-storage water heater is not equipped with automatic shut-off, try to determine whether pilot has been blown out and gas allowed to escape from main burner.

(d) Soot on coils or bowl and lime in circulating lines will act as an insulator and increase gas consumption.

(e) Refer consumer to plumber or agent, when shut-off temperature is too high or coils are limed up inside.

7. Make all necessary appliance adjustments.

8. Determine whether consumption is reasonable, considering number of residents, weather, amount of washing, kind of cooking, incorrect meter read, etc.

9. Determine whether there are invalids, infants, or elderly people who might require more heat than the average person.

10. If there is more than one meter at the location, trace houseline to see if gas is supplied to one consumer from another's meter.

11. Unsolved complaints shall be reported to foreman, and meter not changed.

Regulator Change Procedure

Criteria for Changes:

The regulator shall be adjusted, if possible, to deliver 7 inches running pressure at the meter, and not over 11 inches lock-up pressure. If this is not possible, the regulator shall be changed:

1. When the difference between running and lock-up pressure exceeds 4 inches water column.
2. When running pressure exceeds 9 inches water column.
3. When running pressure is 5 inches water column, or less.
4. Whenever a choked service is cleared; except the 1-H Reliance regulator, which may be left in.
5. Whenever the regulator capacity is too small. (Refer to Chief Dispatcher.)

General Procedure:

1. It is not necessary to take lock-up pressure on a regulator supplying more than one meter, unless it is considered to be building pressure.

2. Make certain that regulator vent is not choked, before removing regulator.

3. If regulator is not properly vented, change the vent to correspond with specifications for regulator vents. (Refer to Chief Dispatcher.)

4. After adjusting or changing a regulator, all the appliances supplied by it shall be adjusted. Where the regulator supplies more than one consumer, the work done for each shall be noted and the information entered on a separate report.

The Approach

High Bill work demands sales tactics and a successful approach is a long step toward the close.

Obviously when you call on a consumer for any reason, your very first step toward winning his confidence should be to introduce yourself as a representative of your company. You should state that you are there at *his* request to help *him* solve a problem.

One thoughtful man remarks, "I always talk very, very distinctly and slowly when I introduced myself to a consumer, for I find that by so doing I can increase his respect for me, and make him more ready to listen to me." This small point is one that may make the difference between success and failure.

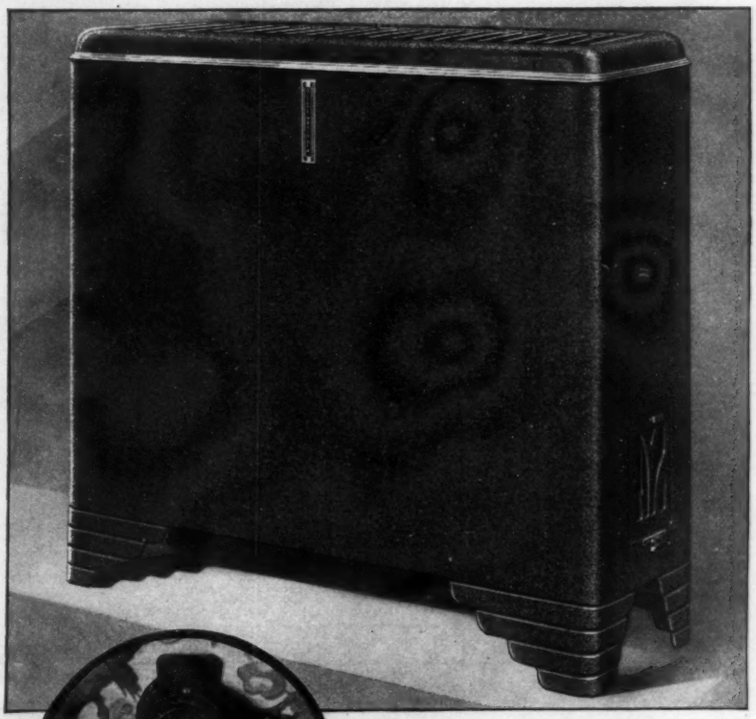
Your approach should be:

1. Sincere
2. Cordial
3. Natural
4. Simple

Get a load of this!

● NEW HIGH-EFFICIENCY, LOW-PRICED ESTATE GAS HEATROLA

- Just in time for fall load-building . . . sales building . . . good-will building. Gas merchandising men who have seen this strikingly new Estate Gas Heatrola all agree . . . "Here's a home-heater that will line up plenty of new customers in front of the PAY-HERE window." Many big activities, featuring this new heater, are already under way or projected.
- There's eye-catching beauty in the new modern-furniture design. And there's plenty of sales-closing pressure in this Gas Heatrola's economy . . . in its convenience, in its solid, honest construction (completely welded and seamed—completely air and gas tight!) . . . yes, and in its easy-on-the-pocketbook price. Write for catalogue and prices. Today. THE ESTATE STOVE COMPANY, HAMILTON, OHIO. Warehouse stocks in Los Angeles, San Francisco, Portland, Minneapolis and Dallas.



The New A.G.A.-Approved Estate Gas Heatrola (two sizes—No. 207, No. 107)

Now! Inexpensive Remote Heat Control—optional equipment on all models of the Estate Gas Heatrola.

Another wonderful leader for space-heater campaigns. Write for facts and prices on No. 161 Estate Gas Heatrola.

Estate GAS Heatrola

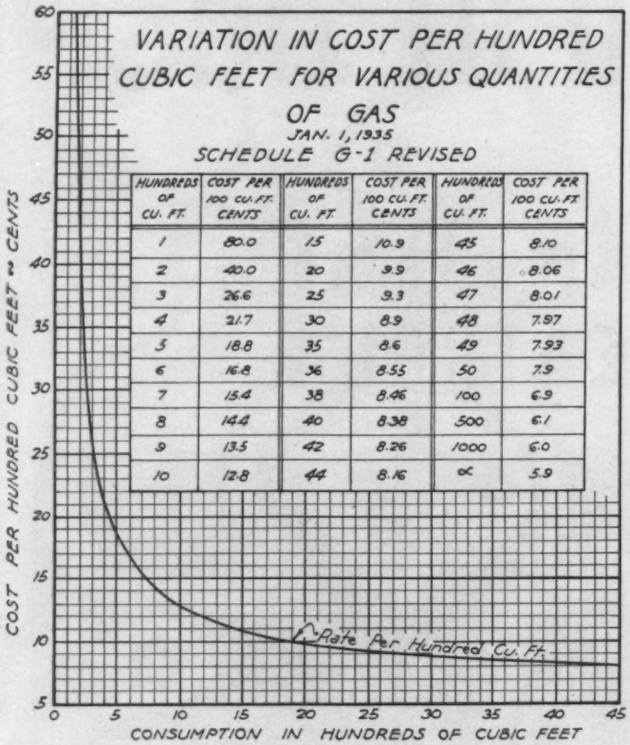
THE SAFE AUTOMATIC HEATER

FOR SMALL HOMES • APARTMENTS • STORES • OFFICES

Establishing contact demands reasonable tact. Trouble develops from the use of *wrong methods.*

Operating Costs

Fig. 1 provides a simple method of obtaining the cost per 100 cu. ft. of gas (Schedule G-1 of L. A. G. & E. Corp) regardless


VARIATION IN COST PER HUNDRED CUBIC FEET FOR VARIOUS QUANTITIES OF GAS
JAN. 1, 1935
SCHEDULE G-1 REVISED
COST PER HUNDRED CUBIC FEET = CENTS
CONSUMPTION IN HUNDREDS OF CUBIC FEET
Rate Per Hundred Cu. Ft.

HUNDREDS OF CU. FT.	COST PER 100 CU. FT. CENTS	HUNDREDS OF CU. FT.	COST PER 100 CU. FT. CENTS	HUNDREDS OF CU. FT.	COST PER 100 CU. FT. CENTS
1	80.0	15	10.9	45	8.10
2	40.0	20	9.9	46	8.06
3	26.6	25	9.3	47	8.01
4	21.7	30	8.9	48	7.97
5	18.8	35	8.6	49	7.93
6	16.8	36	8.55	50	7.9
7	15.4	38	8.46	100	6.9
8	14.4	40	8.38	500	6.1
9	13.5	42	8.26	1000	6.0
10	12.8	44	8.16	∞	5.9

FIG. 1.

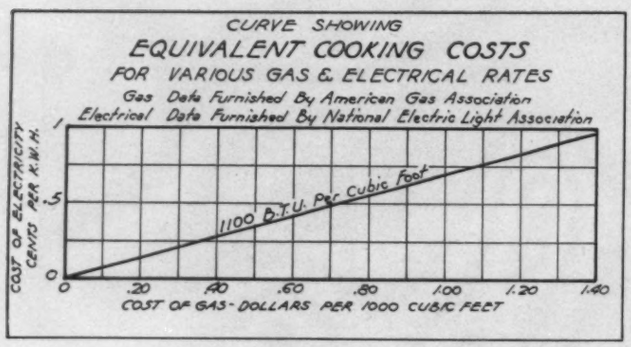

CURVE SHOWING
EQUIVALENT COOKING COSTS
FOR VARIOUS GAS & ELECTRICAL RATES
Gas Data Furnished By American Gas Association
Electrical Data Furnished By National Electric Light Association
COST OF ELECTRICITY CENTS PER K.W.H.
1100 B.T.U. Per Cubic Foot
COST OF GAS - DOLLARS PER 1000 CUBIC FEET

FIG. 2.

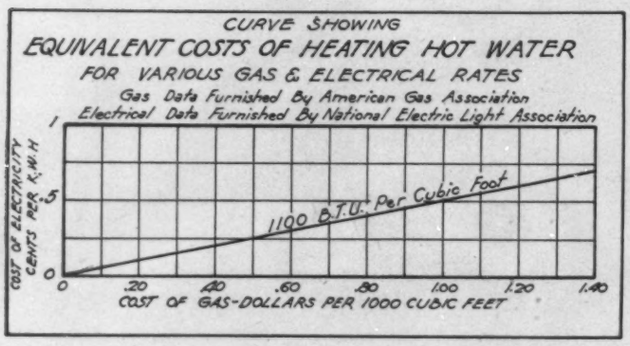

CURVE SHOWING
EQUIVALENT COSTS OF HEATING HOT WATER
FOR VARIOUS GAS & ELECTRICAL RATES
Gas Data Furnished By American Gas Association
Electrical Data Furnished By National Electric Light Association
COST OF ELECTRICITY CENTS PER K.W.H.
1100 B.T.U. Per Cubic Foot
COST OF GAS-DOLLARS PER 1000 CUBIC FEET

FIG. 3.

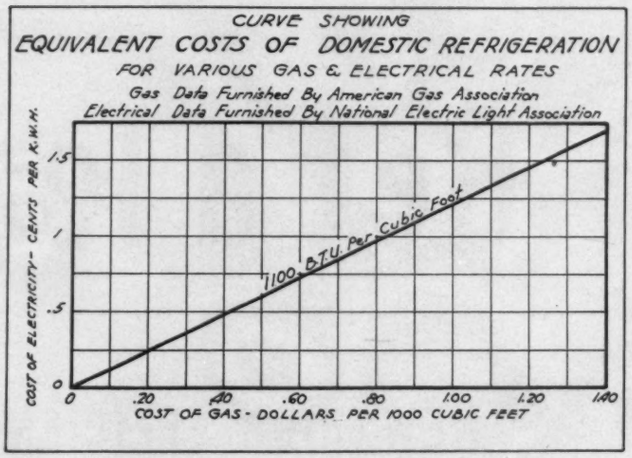

CURVE SHOWING
EQUIVALENT COSTS OF DOMESTIC REFRIGERATION
FOR VARIOUS GAS & ELECTRICAL RATES
Gas Data Furnished By American Gas Association
Electrical Data Furnished By National Electric Light Association
COST OF ELECTRICITY - CENTS PER K.W.H.
1100 B.T.U. Per Cubic Foot
COST OF GAS - DOLLARS PER 1000 CUBIC FEET

FIG. 4.

of the monthly consumption. The chart provides both a table and a curve for your convenience.

For example: The monthly gas consumption equals 1200 cu. ft. Locate 12 on bottom scale, follow the vertical line to where it intersects the curve (rate per hundred cubic feet), follow the horizontal line from that point to the left hand scale and read cost per hundred cu. ft. (Approximately 10c per hundred cu. ft.)

Fig. 1 is especially useful in determining the exact operating cost of any specified appliance, or pilots.

Procedure: Time the appliance in question; obtain actual consumption per hour and by use of the exact cost of gas consumed per 100 cu. ft., calculate exact operating cost per hour or day for that appliance or pilot.

The method outlined above will be most useful in calculating the cost of space heating. However, there are two classes of space heating consumers; namely,

1. Consumers using only one or two small space heaters.

2. Consumers using auxiliary space heaters and a furnace or furnaces.

Application of Fig. 1: The gas bills of those consumers who use only one, or two, small space heaters will *usually* run between $1.00 and $5.00 per month. Anything over this amount is generally for those consumers using space heaters auxiliary to a furnace or furnaces; or their equivalent.

Wherever one or two small space heaters constitute all the space heating equipment in use ($1.00-$5.00 bills), it is more justifiable to consider the range and water heater as having used the greater portion of the gas consumed. Consequently, the space heating cost should be calculated by using the gas at $.069 per hundred cubic feet (or the second step of Schedule G-1).

When it is felt that the space heating equipment consumes an equal, or larger amount of gas than the range, water heater and refrigerator (non-seasonal appliances), then calculate the cost per hundred cubic feet of gas (total gas consumption) using Fig. 1. This is the cost of gas per hundred cubic feet, for space heating, water heating or any other class of domestic appliance operation, since it is assumed they all bear an equal share of the total consumption.

Relative Costs Gas vs. Electricity

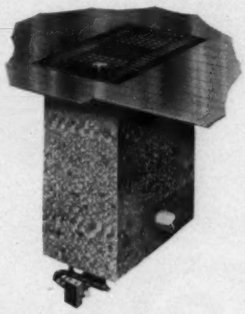
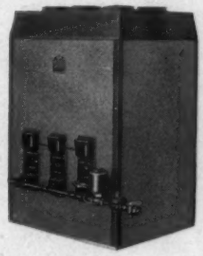
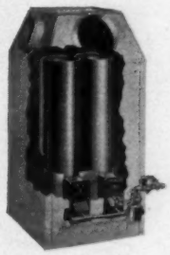
Figs. 2, 3, 4, and 5 may be used to compare the relative costs of gas and any electrical energy which may be used for cooking, water heating, refrigeration, and space heating.* These costs are based on actual appliance consumptions only, relative efficiencies being taken into account. No consideration is given to original appliance purchase prices, maintenance, depreciation or carrying charges on the investment.

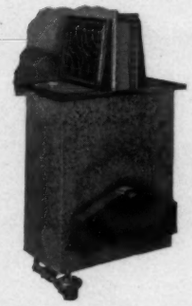
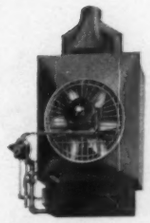
Leaks

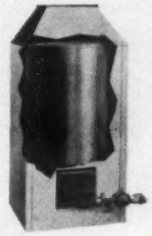
Refunds are made to consumers when a leak is found on Corporation equipment, at or past the *outlet* of the meters.

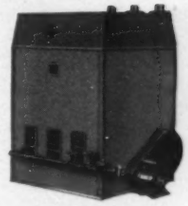
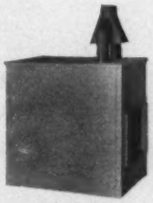
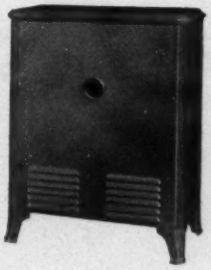
Consumers, in such cases may be informed that a refund will be made. Care should be exercised in quoting the amount of the refund. Example: To calculate refunds for consumers on G-1. In cases where the monthly consumption is less than 4,000 cubic

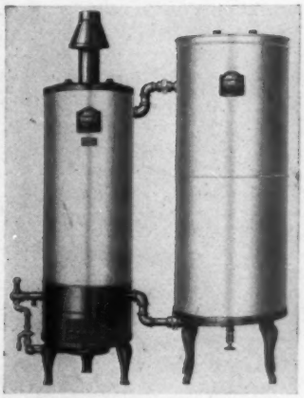
*Under Los Angeles rates and conditions.

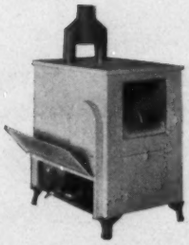
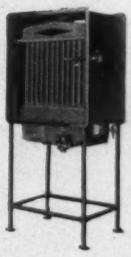
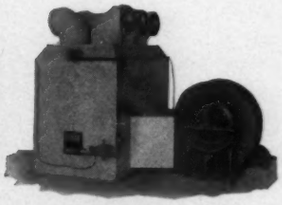








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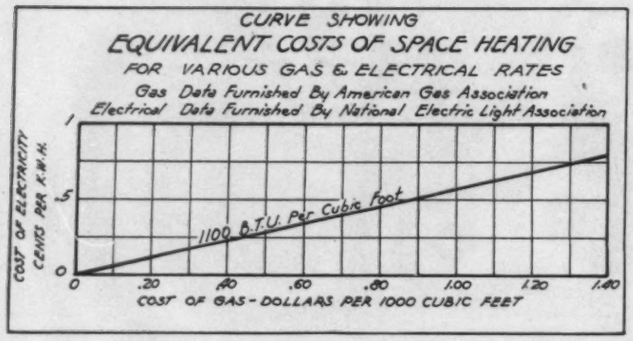


FIG. 5.

feet, use 6.9 cents per 100 cubic feet; cases where the monthly consumption is over 4,000 cubic feet, use 5.9 cents per 100 cubic feet.

To the average public a foot an hour leak is a large one and they may expect to receive leak allowances running up into dollars. When small leaks are found be certain that the consumer realizes *the small effect it has on the current gas bill.*

When leaks are found on consumers' equipment, a statement regarding the amount of leakage in terms of money based on the method outlined above may be made—*but* advise that no refund will be made.

Timing the Meter

Leaks, and/or appliance consumption and/or pilots' consumption.

1. Leaks:

(a) Close all appliances.

(b) Mark location of test hand on meter. This may be done by tearing a small corner of a sheet of paper. The paper should provide a straight edge of at least the length of the test hand. Moisten paper and place it on dial glass immediately over the test hand, taking care to line up the straight edge of the paper with the test hand itself. Place the paper in such a way that the test hand moves away from, rather than under the paper.

(c) Note the exact time.

(d) After the test hand has registered a sufficient amount of gas to permit an accurate estimate of the flow, note the amount of elapsed time and calculate the hourly flow.

Obviously, the amount of leakage can be determined quicker and more easily on a ½ cubic foot per revolution meter test dial than on, for example, a 5 cubic foot meter test dial. Therefore, no set rule can be stated for maximum and minimum test timing periods. Sufficient time should be allowed to determine accurately the amount of gas leakage.

2. Appliance Consumption:

This procedure is identical to that used for determining the amount of gas leakage, except in the first step. Instead of closing all appliances, close all appliances save the appliance whose rate of consumption is being determined. That appliance should be lighted while the meter is being timed to obtain the hourly flow of gas through the appliance.

HIGH BILL COMPLAINT ANALYSES

In general, nearly all High Bill Complaints fall into one of the following four classifications:

I—Consumer with a legitimate complaint.

II—Consumer with illegitimate complaint, but willing to receive instruction or advice.

III—Consumer with illegitimate complaint, but not willing to receive instruction or advice (Chronic kicker).

IV—Apartments and hotels.

I—Consumer With a Legitimate Complaint

A—Faulty Corporation Equipment

Cause: Leak at meter outlet.

Procedure: Test with soapsudes to locate leak. Close all appliances and time the leak for a minimum of 10 minutes. Repair leak if possible. If the leak is on the meter proper, change the meter.

Cause: Regulator.

Procedure: Adjust regulator if possible and practical. When necessary, change regulator if you can, or order regulator changed. Regulate all appliances after changing or adjusting the regulator, if practical.

Cause: Meter over-read or under-read.

Procedure: Explain the error to the consumer and inform her that the bill will be corrected. *Note:* L. A. G. & E. Corp. gas meter reading accuracy is one error in 10,000 reads.)

Cause: "Fast" meter.

Procedure: A meter should be changed for a consumer only after all possible methods of satisfying the complaint have been exhausted. Make a complete check of equipment; a comparison of consumption for the same month of the previous year; a tactful inquiry regarding the amount of entertaining; illness in the home; possible additional appliances; any recent difficulty with appliance performance, etc. If there appears reason for the belief that the meter is fast and it is not possible to get the consumer to assent to trying the meter for another month or two, change it.

Meter performance records:

The Company's record of the performance of its meters gives the representative a very real confidence in the accuracy of this device. Of course, the customer very often doubts the accuracy of the meter and insists that it be removed for test. We believe the meter should be removed, only as a last resort, as in many cases the factors which caused the high gas bill will be discovered by the investigator and will be either removed or modified by the customer, the result of which will be a reduction in the gas consumption. If the meter was removed immediately after the investigator's call, there might be some misconception as to the cause for the reduction in the gas bill that naturally follows. This confusion will arise because a doubt will be born in the customer's mind as to whether the ensuing lower consumption was due to the elimination of a faulty meter, or to conservation in the methods in operation. Of course, the customer is always invited to witness the test of any meter which the Company may remove.

If, after making a thorough investigation, the representative still finds the customer is dissatisfied, the latter is asked to consider some of the points brought out during the investigation and will call back within a few days. It is surprising how often the customer admits, when the representative calls again, that the large gas bill must have been caused by housekeeping methods because the rate of usage has decreased since the representative's suggestions were adopted.

This legitimate complaint can only be verified by a shop meter test. When a meter tests faster than the allowable 2 per cent, the refund is made by the Billing Department.

Proper procedure when a gas meter is changed on account of a High Bill Complaint:

The Better Service Order is not completed by the High Bill man unless he changes the meter. At the time the meter is changed, the Better Service Order is attached to the meter card, and both the card and the Better Service Order are attached to the meter. The meter is tested at the Meter Shop, and the meter card is kept at the Meter Shop until the meter is sent out to be set. The card is sent with the meter. The meter test is recorded on the Better Service Order. The Better Service Order is sent to the Chief Dispatch Clerk, who sends it to the Investigation Department.

The Meter Change Order is completed by the meter changer and turned in to his Dispatcher with his daily work. It is then sent to the Meter Record Department, recorded; sent to the Bookkeeping Department, recorded and filed there.

B—Faulty Personal Equipment: Willing to Receive Instruction.

All appliances should be adjusted for perfect combustion.

Cause: Excessive pilot consumption.

Procedure: Time *pilot* consumption *only* as you found them on arrival. Determine pilot consumption for total number of days included in billing period. By use of rate chart (Fig. 1) determine cost per 100 cubic feet of *all gas consumed* during the billing period and calculate pilot cost. If pilot consumption can be reduced by re-adjusting, explain to consumer and do so. If cost is due to number of pilots in use, explain to consumer, showing small consumption due to individual pilots, but how aggregate pilot consumption influences the bill.

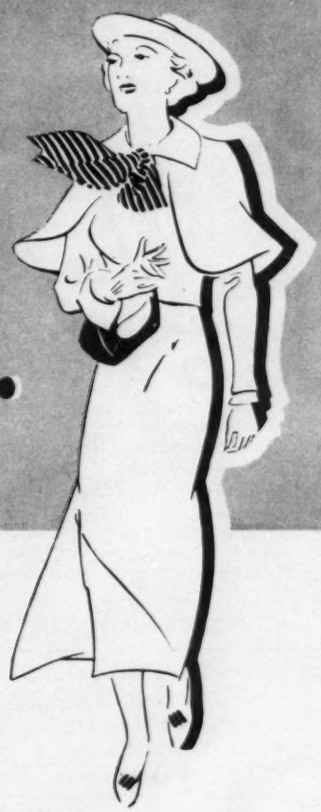
Cause: Water heater.

1. Maximum water temperature.

(a) 140 degrees F. for automatic storage water heaters in single residences.

Mrs. Modern

LOOKS AT RANGES • •



Mrs. Modern is tired. Tired of being tied down to endless cooking routine, tired of a drab, dreary kitchen she is ashamed to show her friends, tired of fussing and fuming with an old-fashioned range.

It is not necessarily true that her old range has outlived its usefulness. There still may be many meals left in it just as there are many miles left in an outmoded motor car. But it lacks the advanced features that make a gas range modern—features of convenience and efficiency that lighten labor and shorten kitchen hours. Also it lacks the smart livening touch of today in style and design that her kitchen needs to make it truly modern.

So Mrs. Modern looks at ranges—looks with a keen eye to value and a crystal clear idea of just what she wants and why. The Magic Chef line and Magic Chef national advertising place you directly in the line of her vision and squarely in the path of a fast-moving and highly profitable replacement business. You can't help getting a substantial share of this business if you fully avail yourself of the many advantages you enjoy as a Magic Chef retailer.

Magic Chef
AMERICAN STOVE COMPANY

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* * *

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(b) Should not exceed 140 degrees F. except when urgently requested by the customer.

Note: Higher water temperatures increase lime deposits, which decrease the heater's efficiency as well as increasing "stand by" losses. This causes an increase in gas consumption.

Lime on heating surfaces constitutes an insulation which retards rate of heat transfer from the flame to the water. To determine if the heater is limed up, employ any one of the following procedures:

(a) Allow heater to operate until tank or coils are completely full of hot water. Turn off gas and turn hot water faucet on full. This permits cold water to enter the heater. Immediately feel of coils or bottom of tank. If the coils or bottom of tank cool at once, they are free from scale or lime. If they cool slowly, they have a deposit of scale or lime on their inside surface. This acts as an insulator.

(b) Ask the consumer whether or not the heater has been drained periodically.

Ascertain age of the heater.

Next: Inspect condition of water issuing from drain cock. Test the temperature of the water and compare with that when the heater was new. The last-mentioned item is to be considered if the flame adjustment is acceptable.

Inquire of consumer whether thumping or hammering sound is noted when tank is re-heating—sure sign of lime. If tank is constructed, with heating element, or spreader, shut off gas at main burner, draw hot water. If heating element cools immediately, it it not limed. If it cools slowly, it is a sure sign of lime deposit.

TABLE NO. 1.

1/16 in. of "lime" reduces heater efficiency	13%
1/8 in. of "lime" reduces heater efficiency	18%
1/4 in. of "lime" reduces heater efficiency	24%
3/8 in. of "lime" reduces heater efficiency	30%
1/2 in. of "lime" reduces heater efficiency	34%

2. Flame should not go into vent.

3. If heater is not equipped with safety pilot control, ascertain if the pilot has ever been extinguished thus allowing gas to escape from the main burner.

4. Other causes of increased gas consumption.

(a) Soot on coils and heating element acts as insulation, reducing efficiency.

(b) Dripping hot water faucets.

TABLE NO. 2.

One drop per second	1⅛ gals. per 24 hrs.
Two drops per second	2¼ gals. per 24 hrs.
Stream breaking into drops	24 gals. per 24 hrs.
1/16 in. stream	84 gals. per 24 hrs.
1/8 in. stream	260 gals. per 24 hrs.
3/16 in. stream	432 gals. per 24 hrs.

TABLE NO. 3.

	B.t.u. Equiv. Loss	Cubic Feet of Gas Loss
1 gal. 140° water wasted	666.4	0.606
5 gals. 140° water wasted	3,332.0	3.03
10 gals. 140° water wasted	6,664.0	6.06
25 gals. 140° water wasted	16,660.0	15.15
50 gals. 140° water wasted	33,320.0	30.30
75 gals. 140° water wasted	49,980.0	45.44
100 gals. 140° water wasted	66,640.0	60.58
200 gals. 140° water wasted	133,280.0	121.16

Note: Above table calculated on 80° F. temperature rise, and 1100 B.t.u. gas.

Cause: Furnace.

1. Pilots (see Pilots).
2. Adjustment (see Adjustment).

TABLE NO. 4. HEAT LOSS IN % FOR BARE OR UNINSULATED STORAGE TANKS.

Tank or Water Temp.	Heat Loss*—B.t.u. per Sq. Ft.		% Loss		** % Saved Insulated
	Bare	Insulated	Bare	Insulated	
140° F.	279	73	....	....	73.9
150° F.	318	82	14.3	0.3	74.2
160° F.	359	92	29.8	.5	74.4
170° F.	400	102	46.0	.6	74.5
180° F.	443	111	64.0	1.1	75.0

*Based on 60° F. temperature difference.

**Shows proper insulation saves approximately 75 per cent of radiation losses.

3. Look to see if pilot is out. If the pilot is out, ascertain if main burner valve is open, allowing gas to escape. This is sometimes the cause of high bills.

Cause: Radiant heaters, circulators, radiators, etc.

1. Pilots (see Pilots).
2. Adjustment (see Adjustment).
3. Broken or missing radiants.
4. Water level in gas-steam radiators.

Cause: Range.

1. Pilots (see Pilots).
2. Adjustment (see Adjustment).
3. Burned out or warped oven and/or broiler linings.
4. Warped oven and/or broiler door.

Cause: Old, obsolete appliances and wasting fuel.

Procedure: Adjust appliances to their maximum operating efficiencies and attempt to replace them with new modern ones. (Ref.: A.G.A. Course—Domestic Gas Salesmanship.)

II——Consumer With Illegitimate Complaint: Willing to Receive Instruction

Cause: Illness or unusual amount of entertainment.

Suggestions: 1. Large amount of hot water used?
2. Unusual cooking requirements?
3. Unusual space heating requirements?

Cause: Colder weather.

Procedure: Use degree-day data to illustrate percentage of colder weather. Use "Degree Day Percentage Chart" and "Degree Day Table" as discussed by Carl A. Nonnenmacher in Gas Age-Record for Dec. 23, 1933. Adaptation of percentage charts is shown in Fig. 8.

Cause: Lack of knowledge of rate.

Procedure: Use proper rate schedule and explain the various blocks in the schedule. Time the various appliances, and using

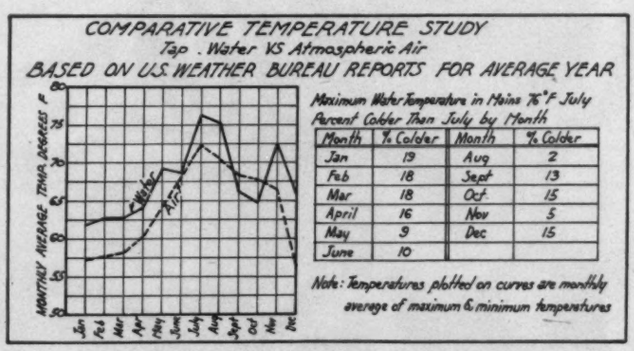
COMPARATIVE TEMPERATURE STUDY
Tap Water VS Atmospheric Air
BASED ON U.S. WEATHER BUREAU REPORTS FOR AVERAGE YEAR
MONTHLY AVERAGE TEMP. DEGREES F
Water
Air
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
Maximum Water Temperature in Mains 76° F. July
Percent Colder Than July by Month
Month | % Colder | Month | % Colder
Jan | 19 | Aug | 2
Feb | 18 | Sept | 13
Mar | 18 | Oct | 15
April | 16 | Nov | 5
May | 9 | Dec | 15
June | 10 |
Note: Temperatures plotted on curves are monthly average of maximum & minimum temperatures

FIG. 6.

one of the two methods of determining cost of appliance operation, give consumer cost of operation per hour.

Cause: Lack of knowledge of meter operation.

Procedure: Explain how meter is read.

Cause: Uneconomical appliance operation.

Suggestions: Use oven for space heating. (Recommend small space heater.

Use large burner when small burner will suffice.
Reduce size of flame when foodstuff or water comes to a boil.
Cover cooking utensils on top burners.
Use oven for more than one item. (Oven dinners.)
Temperature maintained: For each degree Fahrenheit temperature above 70 degrees F. maintained in the average home, there is a 3 per cent increased fuel consumption. This difference of 3 per cent increases as the temperature is raised, so that a temperature of 80 degrees F. may require almost 40 per cent more fuel than a temperature of 70 degrees F.

Water temperature thermostat set higher than practical.

Not closing off unused rooms during heating season.

Cause: Imaginary leak.

Procedure: Have consumer watch while you make the soap test. Have consumer watch while you "time the meter."

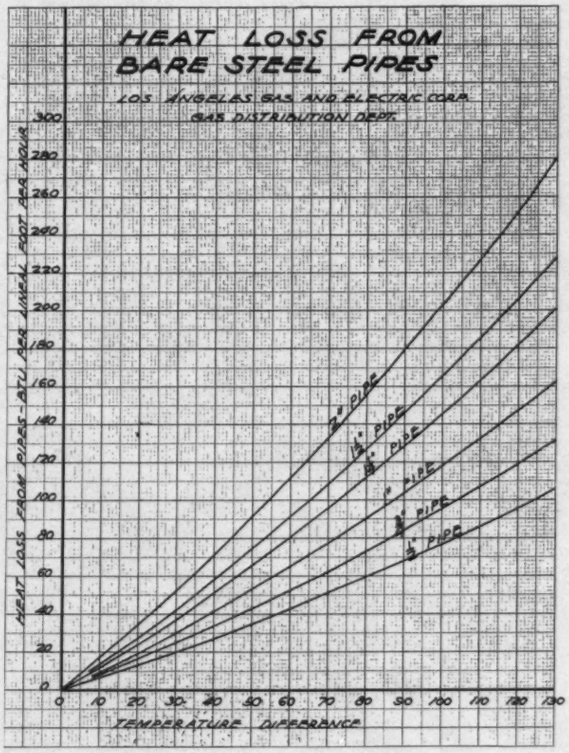

FIG. 7.

Cause: Imaginary meter over or under read.

Procedure: (1) Read meter and compare average daily consumption of previous month with current month.

(2) Explain to the consumer that too many errors in meter reading antagonize the customer. It is poor policy for an employer in any line of business to retain employees who antagonize customers.

Consistent errors in meter reading on the part of any employee means the loss of his employment.

(3) High Bill Orders, as a rule, carry a record of meter indices for at least four months. Assume that during one of the months the meter was either over or under read. The following method illustrates why the consumer can not be overcharged.

Subtract the first read given on the record from the last read given, result total consumption for the period. Add amounts of gas charged to consumer—both totals coincide.

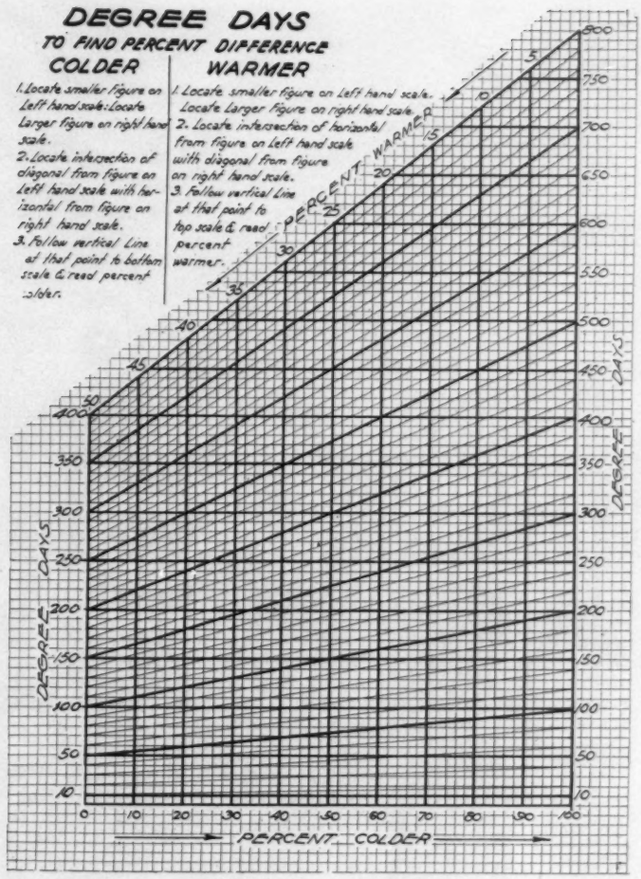
DEGREE DAYS
TO FIND PERCENT DIFFERENCE
COLDER
1. Locate smaller figure on Left hand scale: Locate Larger figure on right hand scale.
2. Locate intersection of diagonal from figure on Left hand scale with horizontal from figure on right hand scale.
3. Follow vertical Line at that point to bottom scale & read percent colder.
WARMER
1. Locate smaller figure on Left hand scale. Locate Larger figure on right hand scale.
2. Locate intersection of horizontal from figure on Left hand scale with diagonal from figure on right hand scale.
3. Follow vertical Line at that point to top scale & read percent warmer.
PERCENT WARMER
DEGREE DAYS
PERCENT COLDER

FIG. 8.

Example:

	Date	Read	Consumption
4th Month	12/8	495	10
3rd Month	11/8	485	20
2nd Month	10/8	465	9
1st Month	9/8	456	

$$495 - 456 = 39$$
$$10 + 20 + 9 = 39$$

This calculation may also be made from the consumer's gas bills if the bills are available.

(4) Show the consumer the true reason for the gas consumption.

III—Consumer With Illegitimate Complaint: Chronic Kicker.

A—Consumer States That the Gas Company Sets Meters to Register Fast. LLL

Procedure: (1) Point out that the consumer accepts the accuracy of the scales in the meat market or grocery store; that when gasoline is purchased at a service station, the accuracy of the pump is seldom questioned.

The gas meter performs for the gas company just what the scales do for the butcher and the gasoline pump for the service station operator.

(2) Refer to pages 9 to 12 and quote Railroad Commission Orders regarding gas meter accuracy and gas meter tests.

B—Consumer States That the Gas Company Pumps Air Into Mains.

Procedure: (1) Set the air shutter on a burner to admit the maximum amount of air to the burner and thus illustrate that either poor or no combustion results. If the consumer maintains that so

much air has been admitted in the mains at the source of the gas supply that no excess can be admitted to the burner successfully, close the air shutter completely and illustrate the resulting characteristic pure natural gas flame.

(2) General Order No. 58 states, in part, that "Each gas utility supplying natural gas for domestic, commercial or industrial purposes shall make tests of the gas delivered to its customers at such locations and with such frequency as may be prescribed by the Commission. . . . . Each gas utility shall file with the Commission as a part of its schedule of rates, rules and regulations, a statement of the standard heating value of the gas supplied by it." In our case the heating value is 1100 B.t.u. per cu. ft.

C—Consumer States That the Gas Company Is Composed of Crooks.

Procedure: (1) Express regret that the consumer feels that way. Point out that the employee body of the gas company is composed of the same kind of individuals as any other employee group. Tactfully bring up the Railroad Commission's control over utilities, and attempt to show that even though her statement were true, she is protected from unjust charges for gas service.

D—Consumer States That Gas Company Does Not Read Meters.

Procedure: (1) Read the meter in consumer's presence and compare with last reading. Show the consumer that the company would lose as much as it might gain by not reading the meters.

(2) Explain "position reading" of gas meters to consumers who state that the meter reader can not see the dial of the meter or does not take sufficient time to read the meter. By the use of a watch or clock, illustrate how it is not necessary to read the figures on the face of the instrument to tell what time it is. Meter readers read an average of 120,000 meters per year, and are more familiar with the meter dials than the average person is with the face of a clock.

IV—Apartment Houses and Hotels

Procedure: (1) Check meter index for over or under-read.

(2) If served by high pressure gas, check the running pressure without fail.

If a low pressure regulator (sometimes installed by outside organizations) is found, or there are any indications that pressure conditions are faulty, check running pressure on low pressure services; 4 in. running pressure for appliances adjusted to 8 in. will operate inefficiently.

(3) If practical, close all appliances and time the meter for leaks. If closing all appliances is impractical, test for leaks around the meter, water heater, and places where manager indicates.

(4) Water heaters and hot water systems.

(a) Take water temperature. If the temperature is over 160 degrees F., it is too high.

(b) Below 130 degrees F. tank temperature usually means high water consumption and consequently high gas consumption.

(c) Test for circulation. Bottom floor cold and top floor hot, or water running hot and cold, indicates circulating return lines are trapped or check valves are stopped up.

(d) Top of booster, or heater hot water outlet, should be a minimum of 18 in. below bottom of storage tank. (Aids circulation.)

(e) Return lines 130 degrees F., or more, means high radiation losses. Throttle valve on return line to slow down circulation.

(f) Minimum number of fittings should be used in piping connecting heater to storage tank. Retards liming and aids circulation.

(g) Uninsulated storage tank losses are approximately $5.00 per month through radiation.

(h) Uninsulated hot water piping (especially return lines), saves radiation loss. (See "Radiation From Bare Pipes Chart.")

(i) Liming tests.

Booster type. Put ear against the heater—hissing or swishing noise indicates lime.

Multi-coil type. Difference in temperature of bushings on the manifolds indicates certain coils are limed.

(j) Heaters should automatically cut off at least four hours in 24.

(k) Spring faucets save on gas and water.

Suggestions: (1) Wherever gas and light are included in the monthly rental charge, tenants are not usually careful in their use of the two commodities.

(2) During the colder months, tenants often light space heating appliances and allow them to burn continuously, whether present or not.

(3) Use of range ovens for space heating.

(4) Inspect appliances in two or more apartments to check adjustment.

Before leaving the consumer's premises, always be sure to clean up any dirt you have made. Be sure you have all of your tools and equipment. Never fail to say "Good-bye," and "Thank you."

Making Your Exit

Upon the completion of your investigation of a high bill complaint, you are probably in one of the following situations:

I—You have justified the amount of the gas consumption; the consumer is satisfied.

II—You have located the cause of the complaint; the consumer is satisfied with your explanation and/or adjustment.

III—You have solved the complaint to your own satisfaction, and convinced the consumer to try your suggestions for a specified period of time.

IV—You have solved the complaint, but have not been able to pacify the consumer.

V—You have not been able to satisfy the consumer, and the complaint remains unsolved.

Situation I: Where you have justified the amount of gas consumption, and the consumer is satisfied; *then,* thank the consumer for the courtesy shown you. Express our pleasure at having been able to serve, and that we desire at all times to aid her in securing the maximum benefits from her gas service, etc.

Situation II: Where you have located the cause of the complaint, and the consumer is satisfied with your explanation and/or adjustment; *then,* see character of exit for Situation I, above.

Situation III: Where you have solved the complaint to your own satisfaction and convinced the consumer to try your suggestions for a specified period of time; *then,* see character of exit for Situations I and II, above. In addition, express to the consumer that you are certain that the observance of the suggestions made will give the consumer maximum benefits at an equitable cost.

Situation IV: Where you have solved the complaint to your own satisfaction, but have not been able to convince the consumer; *then,* express your regret that the consumer does not agree with your solution, and state that you will make a complete report to your superior, and that you are sure everything possible will be done to satisfy the complaint. If you have made any adjustments or suggestions, tactfully request that they be given a fair trial, etc.

Situation V: Where the complaint remains unsolved; *then,* inform the consumer that the complaint will be referred to your superior for further consideration or *as the last resort,* change the meter.

Making the exit in high bill work corresponds to *making the close* in salesmanship. The importance of making a good exit is superseded only, by the necessity of making a good approach.

LOAD BUILDING BY SERVICE MEN*

Introduction

This "Load Building" Manual is an attempt to illustrate satisfactory methods of presenting modern gas appliances to consumers by men engaged primarily in rendering a *mechanical* service. The material can be used by men engaged in effecting satisfactory, efficient operation of a consumer's present appliances after the *mechanical* work has been completed. The potential sales value of the 500,000 consumer contacts made by employees of the Gas Distribution Department per year should not be ignored, either by the forward-looking employee or his company.

"You are the gas company," is not an idle phrase. Wherever any employee meets a consumer, whatever the reason, his actions reflect either good-will or ill-will toward *him* and his *company.* The manner in which the consumer is approached has great influence upon the final impression made by the employee upon any consumer. This manual, properly used, will prove of inestimable value to promote better public relations and a more general acceptance of the commodity we serve.

The material contained herein is fundamentally a condensation of the American Gas Association Course in Domestic Gas Salesmanship. Articles published in trade journals and elsewhere were

*Excerpts from Load Building Manual prepared for Los Angeles Gas & Electric Corp. by R. C. Terradell and R. C. Davis.

AUTOMATIC CONTROL AND SAFETY *at low cost*

for Gas Space Heating Appliances

Room heater users want safety. They want the convenience of automatic temperature control. Give them either or both . . . *at lowest possible cost* . . . with Klixon equipment. Klixon units are snap acting . . . 100% dependable. They cost less. Write for bulletins.

1 — New Klixon Combination Room Thermostat and Pilot Safety Valve.
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5 — Klixon Self-Contained Thermostat and Diaphragm Valve.

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used to supplement this information. Tables and other data are acknowledged where they appear.

Three Levels of Gas Salesmanship

1. Answering Questions.
2. Selling the Machine.
3. Selling the Benefits.

Answering questions promptly and accurately is an important phase of selling. This procedure alone cannot possibly make a sale unless the consumer has already determined to purchase the appliance in which he is interested. Answering questions alone offers no opportunity to create desire nor persuade the consumer to buy.

Selling the machine means that the salesman tries to sell a machine instead of the service which the machine will give to its owner. Ability to explain the construction and operation of appliances is essential, for it, too, is a phase of selling.

Selling the benefits is the biggest single factor in good salesmanship. It combines all phases of selling. Answering questions, and selling the machine play important parts in selling benefits. A consumer is not concerned so much about how the appliance is constructed or how it operates, but rather in what the appliance will do for her in less work and a better home. It is neither design nor price that exert the final pressure, but the benefits to be received.

"Selling the benefits" means, specifically, that the salesman should use methods based on these fundamental requirements; viz., you should:

1. Understand the viewpoint of your customers—what they think about the appliances and why they should buy them.

2. Know how to find out the exact needs of your customers and how to recommend to them the appliances that fill those needs.

3. Be able to state the essential facts about appliances in the briefest, simplest way and know how to bring the customers to the buying point without delay.

4. Be able to explain appliances accurately and simply, and give your explanations a "sales-slant."

5. Know how to help your customers get the best possible use from their appliances, and how to develop a greater interest in gas service in your community and district.

6. Know how to reach out for more prospects and make good customers out of them.

These six requirements are essential for the gasman who wants to utilize the opportunities of the gas business to the fullest extent for the company's advancement as well as his own.

The Five Big Benefits of Modern Gas Service

Modern gas service can bring five benefits to any consumer who will expend a nominal amount of money for modern gas appliances.

Talk these benefits to the consumer:

1. Satisfaction of living in a home that is modern and attractive.

2. Convenience and cleanliness of instantaneous fuel service, always on tap, free from smoke, soot, or ashes. *(Convenience* means *Speed, Dependability, Ease,* and *Accuracy.)*

3. More healthful and more comfortable living conditions.

4. Better regulated warmth for the home.

5. The ability to run his house with less work for himself and his servants.

To successfully sell the benefits of modern gas service, *be tactful,* never imply by word or action that the cooking accomplished on a consumer's present range is not good. *Be specific,* paint word pictures to make a consumer *really* see what you mean.

The Sales Approach

Salesmen engaged in selling from house to house have a choice of three methods with which to effect an entrance into a customer's home:

1. The Price Approach.
2. The Straight Selling Approach.
3. The Service Approach:
   - (a) Survey or inspection method.
   - (b) Adjustment method.
   - (c) General service inquiry.

The price approach depends entirely upon the appeal of a bargain price to effect the entrance and is the least satisfactory.

The success of the straight selling approach depends upon presenting the object which you are selling directly to the customer. If the salesman does get in, he has accomplished two big points, viz.,
—he has his selling talk already under way; and
—he has the knowledge that the customer is interested in the product he has for sale.

The service approach is divided into three methods:

The survey, or inspection method of "getting in," means that the salesman has called as a representative of some company to investigate the service being received by the customer.

The general service inquiry is based on approximately the same idea as the survey or inspection method. No actual work is performed on the consumer's appliances in either case.

Fortunately, the consumer contact employee of a gas company has no difficulty in effecting an entrance, because he has been called by a consumer to render a *mechanical service.* Any sale made by this employee must result from effective use of the adjustment method of the service approach.

Swinging from Service to Sales

The consumer contact employee who is sales-minded must prepare himself for the transition from service to sales from the moment he starts to work. His first task is to note, either mentally or on his order, the following information:

1. Consumer's Appliances
   —what household tasks she is now doing that could be done better with gas.
   —what gas appliances she has.
   —how old they are.
   —what condition they are in.
   —how soon she will probably have to replace them.
2. Consumer's Family
   —how large it is.
   —whether there are children in the house.
   —whether many friends are entertained.
   —whether the house is often left to itself.
   —who takes care of the furnace.
3. Consumer's Means
   —whether she keeps any servants.
   —whether she has a motor car.
   —whether the furnishings of the home seem to indicate good buying power.
4. Consumer's House
   —the number of rooms.
   —the basement.
   —space available for additional gas equipment.
   —whether all the rooms are adequately heated.
   —location of the laundry.

Each call made on a consumer by contact employee does not necessitate a detailed inspection of all appliances. Observation and questions are valuable aids in selecting the modern gas appliances to be presented. Any inspection made, however, should possess the following characteristics:

1. Make your inspection businesslike. Avoid conversation about matters which have no bearing on the job in hand.

2. Be thorough. Make it clear to the consumer that you know your work; this strengthens the consumer's confidence in your ability.

3. Realize where you are. Recognize the fact that you are in the consumer's home. Act accordingly.

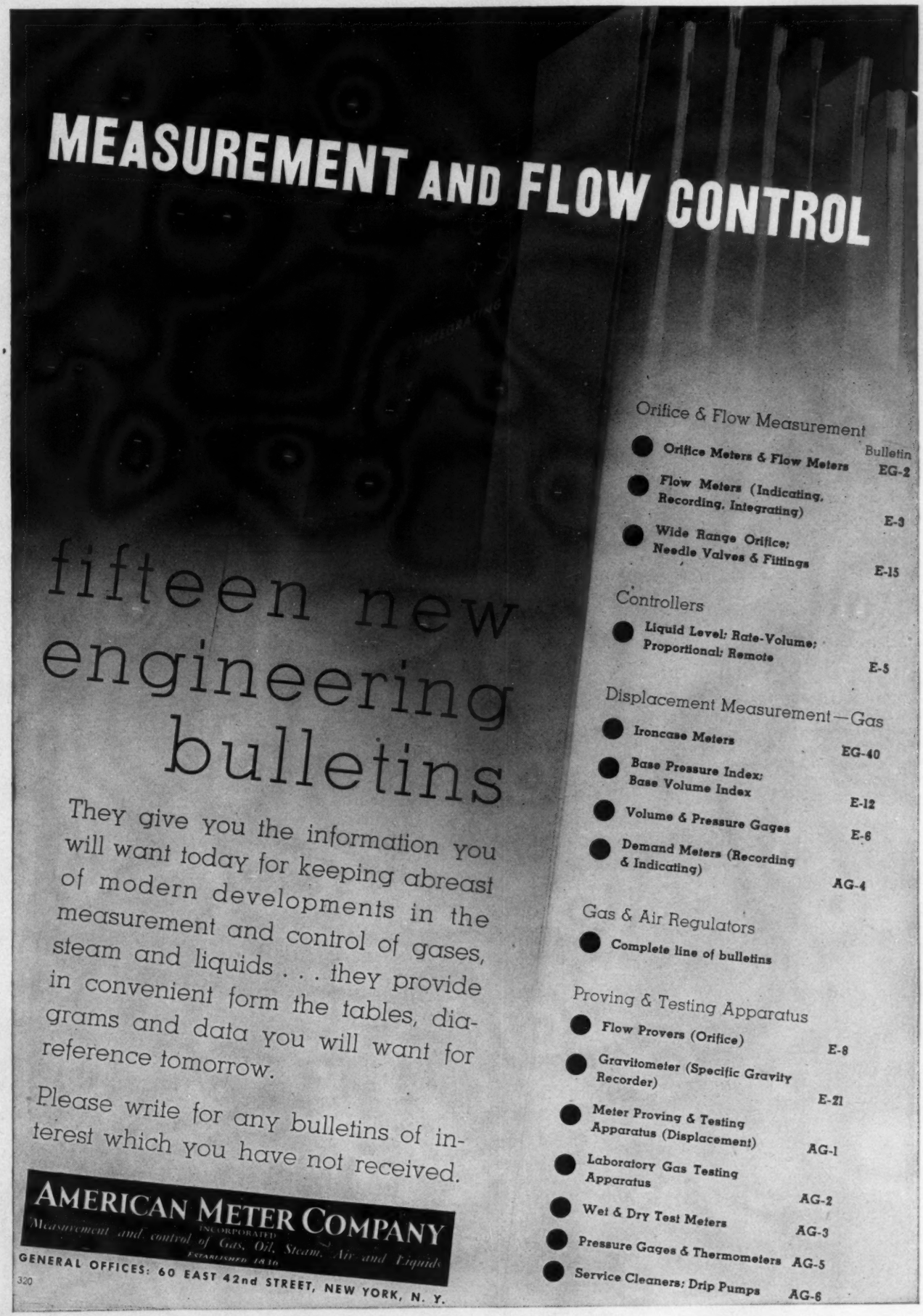
4. Let the consumer help. Get her to watch what you are doing, and explain your procedure as you go along.

5. Sales-slant your inspection. State one or two of the benefits the new appliance has that the old one does not possess. This must be done with tact. *Never "knock" the consumer's old appliance.*

The completion of the mechanical work is the logical time to interest the consumer in modern gas appliances. The inspection has shown which appliance the consumer needs most. Make a statement about the consumer's old appliances based upon the inspection, using a transition phrase like "There is only one suggestion I might make." Bring out one big advantage of the appliance, and, if the consumer registers, lead into a brief selling talk about the appliance.

Inspections made correctly by a consumer contact employee offer many opportunities for him to be of service to consumers. A call for service by any consumer is an announcement that dissatisfaction with some phase of the service rendered by the company exists. One very important result may be obtained by the resulting inspection: The offering of suggestions, which if followed out by the consumer make frequent service calls unnecessary. Make your work simple in the eyes of the consumer. Remove the element of mystery from appliance adjustments. There is no logical reason why any consumer cannot light the pilots on modern gas appliances. A few moments occupied in giving intelligent instructions to a consumer may create confidence in the appliance due to its simplicity.

The operations of cleaning lint from air mixers and reaming the ports of a burner can be understood and accomplished by all con-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Service Cleaners; Drip Pumps AG-6

sumers. There are many minor adjustments on appliances which could be made an integral part of the housewife's daily routine. Never fail to state that should the following of suggestions prove inadequate to the need, the company will be ready to render the desired service. Gas appliances are simple in operation and construction; make them appear as such to all consumers.

During any inspection, questions can be very useful. However, care must be exercised in their use. The following precautions are important:

1. Avoid blunt questions.

2. Avoid personal and useless questions. Never give the impression of being curious about matters which have no bearing on the job in hand.

3. Avoid too many questions in a series. This might cause the consumer to feel as if she were being cross-examined.

Sales Tactics

To present any modern gas appliance effectively certain information must be obtained and a favorable impression must be made on the consumer by the contact man.

1. It is very important to win the confidence of consumers through the manner in which they are approached, and the manner in which the necessary *mechanical service* is performed.

2. It is necessary to find out the exact requirements of each consumer in order to recommend the right size and style of appliance.

3. After the consumer's requirements have been determined, all the vital, important facts about the appliance should be put into a few brief remarks. These brief remarks are known as "headline" sales talks, and will be referred to in connection with each appliance as described in the Manual.

There are three rules which materially help in selecting the right appeal to use when ready to present the modern gas appliance selected to fill the consumer's greatest need. These rules are applicable for all modern gas appliances:

1. During the time necessary to perform the mechanical service, bring out all of the big benefits of the appliance before stressing any one of them.

2. Watch the consumer's expression and see how each point made registers.

3. Note questions asked by the customer to see which subject seems to interest her most.

Good Explaining Is Good Selling

Most consumers want to know more than merely the type and size of appliance they should have and its outstanding benefits; they want to know, in addition, *why the appliance will give them those benefits.*

The explanation that will appeal to the consumer is the one most closely tied up with those benefits.

Tell the consumer the "why" behind the benfits that the appliance gives her.

Make every point a selling point.

Make every point *interesting.*

Show the consumer not merely the facts about the appliance, but how those facts affect *her.*

Talk the Consumer's Language

No explanation is clear which contains unfamiliar and unexplained technical words.

Naturalness of manner, as well as simplicity of language, plays a big part in making explanations sell.

Talk easily and conversationally to the consumers; do not lecture them.

Teach the consumers, but do not let them suspect that you realize they are being taught.

Start by Giving a General Idea of the Appliance

State clearly the general principles of the mechanism, and outline its method of operation in a few words. In so doing, two important ends are attained:

1. Time and effort is saved, because many consumers are satisfied with a brief, clear statement of the essential principles;

2. This makes certain that the consumers have the knowledge needed to comprehend the details, if it is necessary to explain them.

The Price Question

One of the first questions a consumer is apt to ask concerning any modern gas appliance is, "How much does it cost?" Postpone the discussion of price or operating cost until complete justification of it has been presented. After the consumer has the facts concerning any modern gas appliance necessary to place its value above its cost, use the price as a lever to obtain permission for a salesman to call at the consumer's home as follows:

Stress that modern gas appliances are sold over a large range of prices. Explain the Blue Star Seal of Approval and what it means. Inform the consumer that arrangements for a representative to call with the latest information can be made for her *convenience.*

Editor's Note: Following this general introduction the Manual includes detailed information on how to sell each individual type of appliance together with operating data and cost comparisons very valuable to the service man both in his routine work and as a salesman. A third manual supplied to employees of L. A. G. & E. Corp. contains questions and answers on many subjects of both general and specific interest. The manual is indexed topically.

Compensation of Industrial and Commercial Salesmen

By K. B. Anderson

Manager, Coast Industrial Gas Company

PROPER compensation of industrial and commercial salesmen is of essential importance in California where the industrial and commercial accounts produce one quarter of the gross revenue from gas operations. It is difficult, however, to formulate definite ideas on compensation without first considering the organization of the personnel and functions of the industrial and commercial sales department.

K. B. Anderson

That we might start with a general knowledge of the organizations in use, questionnaires were sent to various companies on the Pacific Coast and through the cooperation of C. W. Berghorn, secretary of the Industrial Section of the American Gas Association, to some 14 large companies in the East and Middle West. A summary of the responses to these questionnaires is shown in Table No. 1.

Recognizing the individual peculiarities of each company and each territory, which peculiarities affect the details of organization, this report is somewhat of an analysis of the above summary and deals only with a few generalities which may apply in principle to any situation.

Since the value of industrial load is reflected to a large extent in the effect which it has on other departments, the direction of its administration should be broader than is required in other sales activities. Most of the companies recognize this in heading up the Industrial and Commercial Sales Department with a supervisor who reports directly to an officer of the company. In this way liasion between various departments is preserved by short lines of communication and policies established leading to the broadest realization from the industrial load. Some of the broader functions of industrial gas are:

1. Load equalizing—improving daily and annual load factor.
2. Justification of branch lines—opening new territory.
3. Creation of industrial communities where availability of gas influences plant location.
4. Profits from the load itself.

The two functions of the Industrial and Commercial Department are:

1. Adding new load.
2. Keeping the load on the line.

Companies entering the field quite properly emphasize the first but are slow to recognize their responsibilities under the second until considerable damage has been done, through the loss of business and good will. The value of superior service in overcoming the price advantages of competitive fuels is a trite but nevertheless true axiom and the sales department should assume the responsibility for its fulfillment whether the actual performance of the service duties is a function of the department or not.

Most of the companies in the summary (Table No. 1) recognize their two functions by having the industrial sales supervisor retain technical and politic control over the salesmen in the field, with administrative control vested in the division manager or district agent in the territory. This decentralizes the functional control of the salesmen and centralizes the policy and technical control. The exact line of demarkation is determined by the degree of iso-

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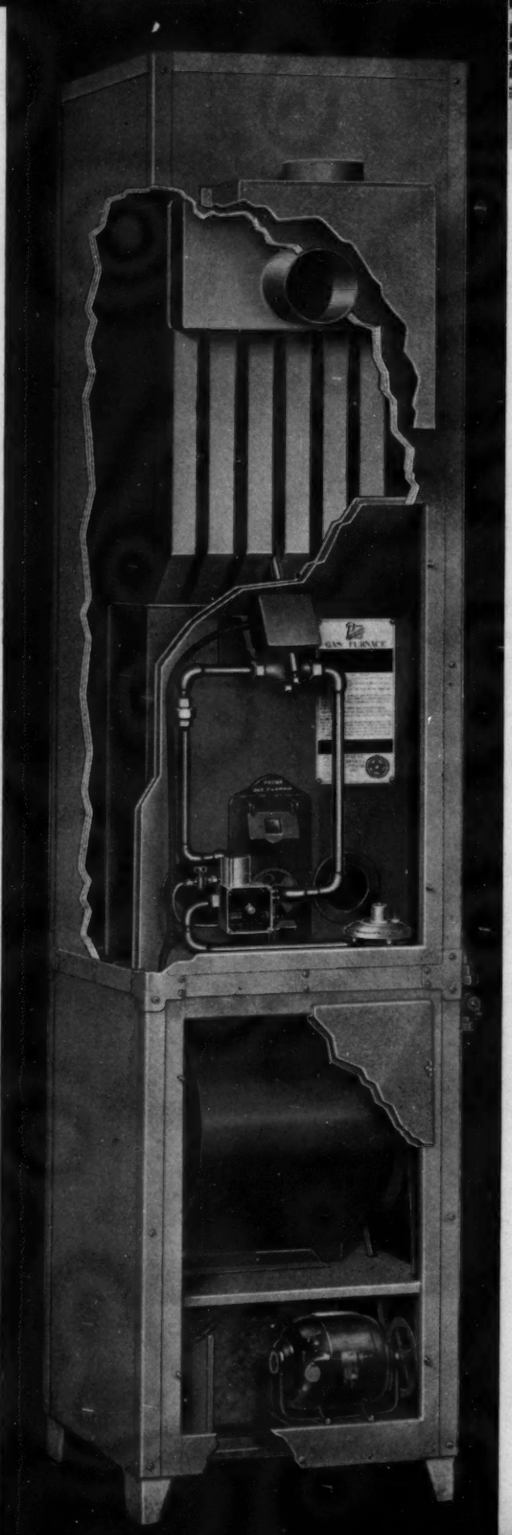

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Comfort System Anywhere!

Payne "FAU" Furnaces are the embodiment of all that is desired for Year 'Round Comfort and Convenience . . . Controlled winter warmth and balmy summer ventilation.

COMPACT . . . EFFICIENT . . . HEALTHFUL . . . ATTRACTIVE!

■ Selected for heating and ventilating Casa de Tempo, the completely gas equipped "Home of Today", the Payne "FAU" occupies a position of particular interest at the San Diego Exposition. Two units serve this very modern home. The accompanying first floor and foundation plan show installation possibilities without use of basement.

The Payne "FAU" Furnace is applicable to varied climatic and structural conditions. Recent shipments include a unit for installation in New Haven, Conn.; another for use with Butane gas at Sarasota, Florida, and another for use in Sydney, Australia.

A number of gas company offices are now enjoying this modern method of heating and ventilating. Among them are several offices of the United Gas System in Texas, the Visalia office and the new Western Ave., Los Angeles, office of Southern California Gas Co.

No better assurance of complete customer satisfaction can be given than to include Payneheat in your heating campaigns. There is a Payneheat System for every building and climate.

■

"Ask for descriptive circular"

PAYNE FURNACE & SUPPLY CO.
Beverly Hills . . California

Those attending the Pacific Coast Gas Association Convention are cordially invited to visit the display of Payne heating equipment at the Natural Gas Exhibit in the Palace of Better Housing at the San Diego Fair. This display includes the "FAU" Furnace as well as other types of heating equipment manufactured by Payne.

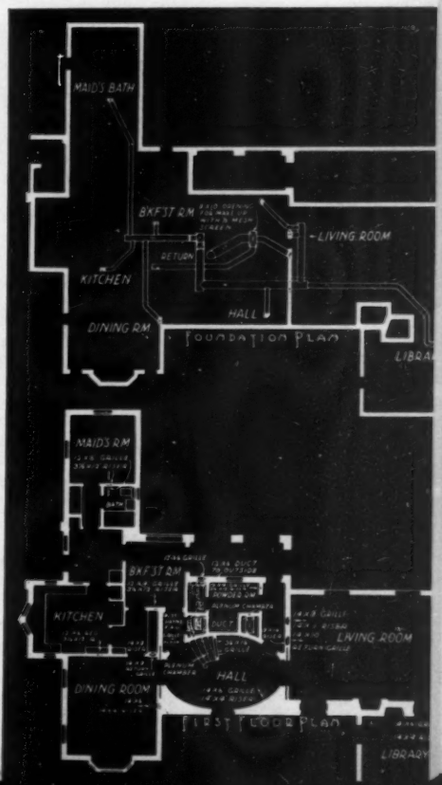


TABLE NO. 1.

	EASTERN AND MIDDLE WESTERN COMPANIES							CALIFORNIA COMPANIES			
	A	B	C	D	E	F	G	H	I	J	K
Number Industrial Consumers	375	4030	950	3618	1709	5700	130	348	1100	596	277
Industrial Sales—Millions Cubic Feet	4904	2500	1150	1161	1234	23100	2131	2663	18000	6700	18382
Industrial Revenue—Thousands Dollars	1560	1801	....	765	646	2000	175	541	3000	1000	....
Number Commercial Consumers	14883	43688	1880	35478	8746	43000	3612	51000	27200	430	277
Commercial Sales—Millions Cubic Feet	2038	3026	2300	2519	787	28400	2008	....	1850	1600	8218
Commercial Revenue—Thousands Dollars	1052	3343	....	2083	840	4100	296	....	1560	891	....
Number Industrial Salesmen	12	14	2	6	5	25	3	6	14	12	....
Number Commercial Salesmen	7	11	6	2½	4	0	1			18	....
Supervision											
Industrial Sales Supervisor	x	c	x	x-e	x	x	x	i			x
General Sales Supervisor									x		
Distributor or Division Manager		x							x	k	
Distributor or Division Sales Supervisor											
Assignments											
Geographical Assignment	x	x	x	x			h		x		
Classified Assignment	a										
Combination of Above					x	g	x	x			x
Staff of Specialists										x	
Compensation											
Monthly Salary	b	x	x	x	x	x	x			x	x
Monthly Salary and Commission	x		d		x				x		
Commission Basis											
Mc.f. Added			x								
Gross Revenue					f				j	l	
Appliance Sales	x		x								

Explanation of Symbols

(a) Younger salesmen assigned to geographical territory. Older salesmen assigned to larger accounts and special assignments over entire territory.
(b) Salesmen divided into three classes, each having maximum and minimum limits of salary.
(c) General industrial fuel representative.
(d) Industrial salesmen on monthly salary; commercial salesmen on weekly salary plus commission on equipment or M c.f.
(e) Industrial sales supervisor for industrial salesmen; commercial sales supervisor for commercial salesmen.
(f) House heating salesmen paid $100.00 per month, plus $8.00 per burner, plus percentage of revenue.
(g) Junior sales engineers cover geographical territory but special account handled by senior engineers.
(h) All industrial men assigned to territories but one specialized in steel treating and another metal melting and boilers.
(i) Manager, commercial and industrial sales.
(j) Flat amount for each surplus contract signed. Commission based upon estimated revenue.
(k) District superintendent.
(l) Commission based on load added is paid to any employee who turns in a prospect which is sold.

lation, etc. In general, the salesman is responsible to the industrial sales supervisor for performance and to the district or division head on public relations and employee relations.

Several interesting schemes of job assignment are brought out in Table No. 1:

Two companies use geographical assignments as a training ground for the junior salesmen. They serve all except the exceptionally large or highly specialized accounts within their territory. The large and specialized accounts are assigned to the senior salesmen who have more of a classified assignment.

Another company assigns all men to geographical territories but, if one happens to have specialized training, he is assigned to special problems in other territories when the need arises.

Another company assigns salesmen to territories but has a staff of engineers with specialized training who circulate among the districts assisting the salesmen to develop certain fields or to solve special problems.

All companies reported preference for straight salary compensation of industrial men, with variations in the methods used on commercial men. Commercial accounts are sufficiently sterotyped to warrant some form of commission or bonus for the intensive exploitation of some particular field such as househeating (classified as commercial by some companies), but a substantial salary should be paid to justify the company in demanding a certain amount of time to be spent on "old business." If the principal remuneration is commission, in fairness the company should stick to the rules set up under the plan and not interfere too much with the activity of the salesmen. A salesman on a commission will "play the breaks" and no amount of forethought in establishing the rules will eliminate the "bugs."

The industrial field is much too complicated to permit of a commission system. As we have attempted to show above, too much depends upon the industrial load to subject it to the maneuvering and scheming of commission-seeking salesmen. The time which the supervisors would have to spend on formulating a plan of commissions could be more profitably utilized in studying the merits of the individual man and regulating his remuneration according to the various and changing circumstances known best to the supervisor. He should face his responsibility to the company and to his men and discriminate wisely. If he is right his men will be fairly rewarded and the company will get the most for its money. If he is wrong too often, he is not qualified for his job and there will soon be another in his place. This is as it should be. No plan will take the place of proper supervision.

The time-proven principle of fixed responsibility would seem to apply admirably in this case. An ideal arrangement would be for the salesman who negotiated the original contract with the consumer to act as the intermediary in all contacts between the company and the consumer. He alone knows the details of promises made and preferences expressed at the beginning. His communion with the consumer would avoid the embarrassment of untimely approaches and time-nurtured grievances.

The management in turn could hold the industrial sales supervisor accountable for all aspects of the industrial load, as he would be in a position to intercede in any developments which portend trouble.

Needless to say, the proper operation of such an ideal would require corresponding calibre in the personnel all the way through and the industrial sales supervisor's first and biggest sales job would be to secure recognition of the value to the company of men of such calibre.

BUTANE-PROPANE NEWS

Butane in Double Role at a Mountain Resort

. . . FUEL and REFRIGERANT

June Lodge in the High Sierras—butane-equipped.

By ARLAN E. DE BURN
Consulting Engineer
Los Angeles, California

DUE to the general availability of liquefied Petroleum gas in bulk quantities, through tank truck deliveries, many new applications for the fuel are opening up in fields which until recently could not be served because of cost considerations. Installation of miniature "central plant" gasifying units has made possible the use of commercial mixtures, with consequent lower costs. Among the consumers which can profitably take advantage of such service are large domestic, camp and resort installations.

A. E. DeBurn

The following installation is in operation at June Lodge, June Lake, Mono County, Calif., in the High Sierras, and is of particular interest in its method of providing free refrigeration from the latent heat of vaporization of the fuel, augmented by reliquefication when there is not sufficient fuel consumption to maintain desired temperatures.

The fuel utilized consists of approximately 25 per cent propane, 50 per cent iso-butane and 25 per cent n-butane, although the percentages are varied with the seasons to maintain a storage tank pressure of from 60 to 80 pounds gauge under varying atmospheric temperatures. This butane is blended in the Los Angeles Basin and transported to its 7,600-foot elevation and 358-mile distant destination by motor truck in 3,000-gallon shipments. From the tanker the fuel is pumped into the 4,000 net gallon storage tank located up the hillside 100 feet behind the main Lodge building.

June Lodge itself is a huge two-story building, 80 by 150 feet, its natural bark-clad exterior blending perfectly with the surrounding pines and mountainsides. From the center of the high peaked snow roof projects the chimney of the largest open fireplace in the United States. Following the rustic design the main lobby is 60 by 110 feet, with the octagonal natural rock fireplace in the center. Logs smoulder there constantly, but even with a roaring fire on chill evenings auxiliary heat from two butane-fired hot air furnaces is necessary to reach the remote corners of the great room and the adjoining guest rooms and service quarters.

A few hundred feet away is June Lodge Villa with its store, 22 cottages and two bathhouses, all butane equipped. The fuel usage from this source, added to that from the main Lodge and its 40 guest rooms, with requirements for circulating hot water, dining room, coffee shop, kitchen, laundry, bath rooms, Kohler light plants and servants quarters, amounts to an average fuel consumption of 75 to 100 gallons per day of butane even in mild summer weather.

With this fuel consumption butane refrigeration is entirely feasible, and to care for slumps between hours of adequate consumption, reliquefication through compression is introduced. Fig. 1 shows the complete fuel circuit. Step by step operation and appliances may be described as follows:

Upon leaving the storage tank the liquid is reduced to a constant pressure of 60 pounds per square inch to maintain uniform operation of the various refrigeration expansion units. This first stage of liquid regulation is by a diaphragm-type spring loaded reducing valve of adequate capacity, protected by a strainer and by-passed by a diaphragm-type relief valve permitting the return of liquid to the storage tank should pressures rise above the safety point in the liquid distribution lines. In fact, adequate safety valves or by-passes are provided wherever pressures could mount due to a lock-off of a volume of liquid between manual or automatic valves, occasioned by an increase in pressure from atmospheric temperature changes.

Actual refrigeration is in four separate units, the major one being a 6 ft. 0 in. by 6 ft. 6 in. by 7 ft. 0 in. I.D. walk-in meat room. Arrangement of the deck and coils is the same as for any refrigerant and the usual requirements are observed to secure proper air circulation. Liquid butane is expanded through a thermostatically controlled automatic refrigeration expansion valve into two banks of 6 in. by 6 in. square fin coils consisting of two coils to each bank in series, having a total of 270 square feet of surface.

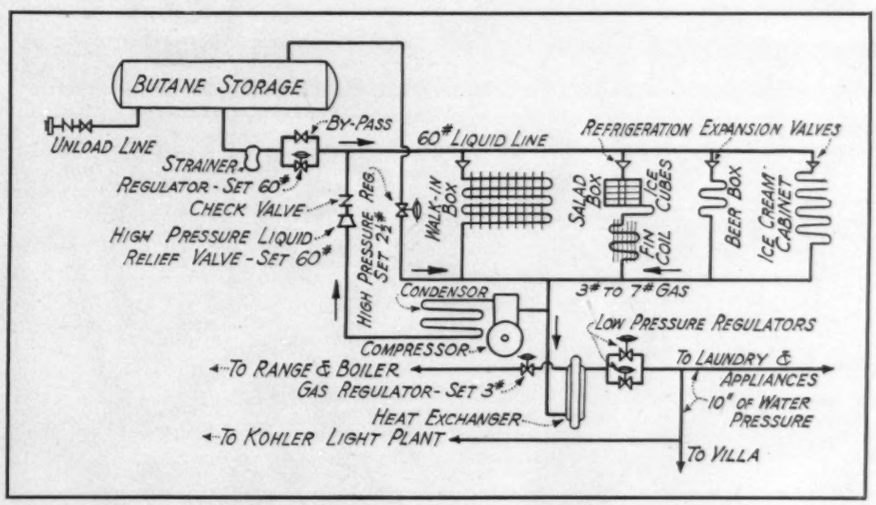
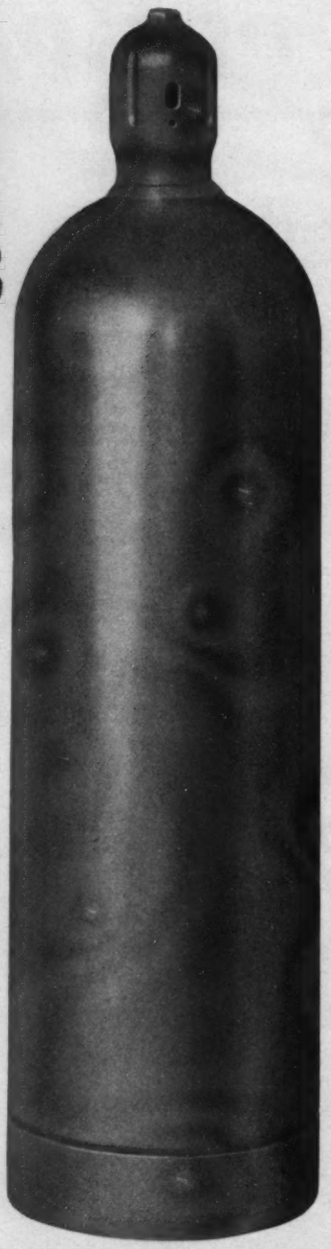


FIG. 1. Flow diagram of butane refrigeration system at June Lodge.

FAR AHEAD



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CONTAINERS FOR GASES. LIQUIDS AND SOLIDS

Best results are secured by first expanding into the coil adjacent to the side of the deck where the hot air rises. The thermostat bulb of the expansion valve is attached to the discharge pipe from the final coil. The expansion valve is set to deliver at 8 pounds pressure when the room is warm and is automatically cut down by the thermostat as temperatures drop. The rather high delivery pressure is necessary in this case to pass sufficient liquid so the coils will not "starve", as this meat room is really a part of the kitchen, subject to high outside temperatures and with a large walk-in door which is "fanned" a great deal during preparation of meals. In practice the first coil frosts rather heavily when the room is at rest, the frost tapering off on each of the succeeding coils so that color just shows on the fourth one. When the room door is opened continuously or a lot of warm food stuffs are brought in, the coils automatically defrost themselves, keeping a well balanced cycle. The discharge from the coils is led to a header pipe common with the other refrigeration units and thence to the heat exchanger. Temperatures are maintained from 35° to 40° F. in this room.

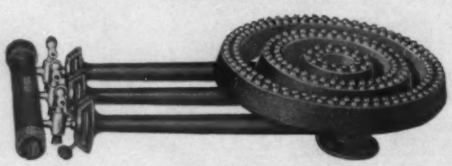
Liquid butane is brought to each refrigeration unit individually and regular refrigeration copper tube, coils and expansion valves have proven adaptable to butane use. The second point of refrigeration is a converted ice box 8 ft. wide. 30 in. deep and 6 ft. high. In the central ice compartment is installed a regulation set of ice cube freezer trays which make a total of 280 cubes. The average time for complete freezing is about 3 hours. Expansion is through the same type valve directly around the cube freezer and then the discharge is led into a small fin coil to give further cooling to the ice box itself. Discharge pressures here are carried at about 4 pounds, as the load is not heavy and lower pressure reduction produces greater expansion and faster refrigeration. The thermostat bulb is on the final discharge from the small fin coil, holding the bulk of the box at 42° F.

The third box under refrigeration is the bottled goods or soft drink box which is kept at 40° with six turns of ½-in. copper tube as the evaporator. Only three turns of this coil are utilized to their full refrigeration capacity, the thermostat bulb being placed on the third turn. Too much refrigeration here would freeze and burst the bottles and also freeze the soda fountain drinking water coil which is placed in the same box.

The coldest spot is the ice cream cabinet which is held between 5° and 10° F. Expansion here is at about 3½ pounds pressure into ½-in. copper tube coils which completely line the interior of the box. All of the coil is utilized, the bulb being attached to the extreme outlet as the ice cream cannot be too cold.

The thermostatic type expansion valves are used to protect against freezing the different types of food in the boxes. Temperature control is gained by varying the location of the thermostat bulb on the discharge side of the various coils. Frost will form up to where the bulb is clamped. This control of frosted surface combined with expansion valve pressure adjustment allows perfect balancing between the different boxes at different temperatures.

Should all boxes become cooled down to a point where each expansion valve was cut



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off by its thermostat, pressure on the discharge side would drop and with the valves automatically shut off the fires would have no fuel. To provide against this a standby between the main fuel supply and the heat exchanger is provided, with a regulator set to deliver when the discharge drops slightly below 3 pounds.

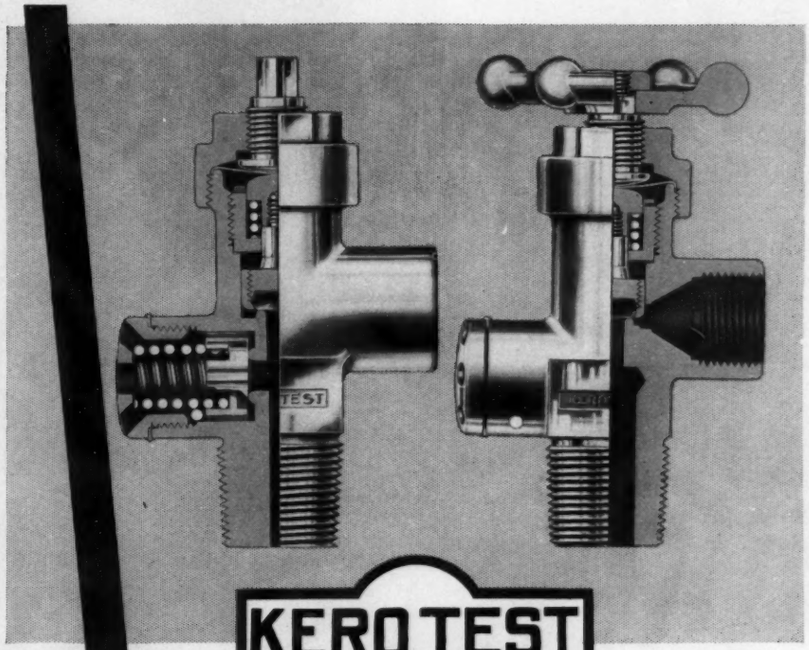
Under normal operation and with sufficient fuel consumption the discharge from the refrigerating coils is carried through a hot water type heat exchanger to insure absolutely dry gas before final pressure regulation and consumption. On the June Lodge job the old three-oven wood-burning range and the Birchfield hot water boiler were converted to 3-pound butane burners, while the balance of the appliances including steam table, coffee urn, laundry mangle, gas stove, space heaters, cottage hot plates and circulators, hot water storage heaters and Kohler electric generating engines operate on the conventional 10 inches of water pressure.

When there is not sufficient fuel being consumed by the appliances to care for the gas liberated in the refrigeration processes the coil discharge pressure will gradually build up and if permitted to reach the set pressures of the automatic expansion valves, flow would cease. To maintain refrigeration with retarded or no fuel consumption a line takes off from the discharge header of the coils to an ice machine compressor. This is electrically driven by power from the Kohler plants and is set to cut in when the pressure reaches 7 pounds and cut out at 3 pounds. The gas is compressed and circulated through a water tube condenser where it is liquefied. Liquefication is gained by holding a head pressure of 60 pounds between the condensor and the storage tank. Thus the expanded gas is compressed, liquefied, and put back into the storage or receiver, just as in the conventional refrigeration cycle, except that this unit is in operation only when fuel consumption is not sufficient to care for the refrigeration load. In actual practice it works only during short periods totaling about 4 to 7 hours out of the 24 at June Lodge.

The selection of proper apparatus and specialties adaptable to butane service of this type required considerable study and some experimentation. The results justify the effort as the operation is fully automatic and aside from checking the oil level in the ice machine compressor no service has been necessary.

Computation of fuel consumption for refrigeration and required coil surface follows the usual practices and formulae. Knowing the required B.t.u. input for the appliances in service, the fuel consumption in pounds per hour of the liquefied petroleum gas mixture to be used can be figured. Reference to the curves shown as Fig. 2, Page 21, Handbook of Butane-Propane Gases (Second Edition) will give the latent heat for the mixture. Hence the refrigeration will be the fuel in pounds per hour times the latent heat = B.t.u. per hour.

The dew point, or complete evaporating temperature for the mixture to be used at the pressure to which it is to be expanded in the refrigeration coils, is the next computation. Subtract this temperature from the temperature at which the refrigerator compartment



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Designed with a spring safety relief, these Kerotest Valves conform to all the rulings of the authorities for shipping cylinders and drums containing inflammable liquids . . . provide positive pressure release . . . designed with clear openings for the escape of gases or liquids when pressures are built up beyond operating limits . . . automatically close when excess pressure has been released, eliminating unnecessary waste of gas or liquid. Diaphragms can be inspected and serviced "on location" while the valve is under pressure without removing the valve from the cylinders.

Available in Type 135 with handwheel—POL female L.H. Outlet. Type 135A without handwheel—POL female L.H. Outlet.

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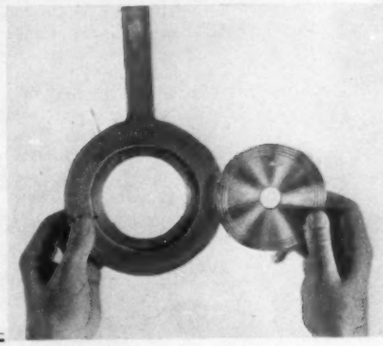
Permit Re-Use of Worn-Out Orifice Plates at Fraction of First Cost

The new Daniel Wafer Plate, of stainless steel, plus a simple machine operation, now makes it possible to salvage discarded orifice plates of the conventional type, thus saving the oil and gas industry thousands of dollars. The illustration on the right tells the whole story. Write for full details.



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is to be maintained to secure the temperature difference.

The surface in square feet required for vaporization will be the refrigeration B.t.u. per hour divided by 2 times the temperature difference. This surface can then be computed into external surface of lineal feet of pipe, copper tube or fin coils.

N. B. G. A. Sponsors Two Meetings on West Coast

UNDER the direction of H. Emerson Thomas, president of the National Bottled Gas Association, two meetings were held on the West Coast last month for members of the liquefied gas industry. An interested group met at the Palace Hotel, San Francisco, on August 21, and another at the Biltmore Hotel in Los Angeles on August 23. Mr. Thomas presided at both meetings.

H. E. Thomas

Sponsored by the N.B.G.A., the intent of the meetings was not only to discuss the service functions of that organization but in general to provide an exchange of experience between eastern and western sections on major problems.

Paramount need for improvement in appliance efficiencies, with particular respect to meeting electric competition, received considerable attention. Mr. Thomas covered the Association's recent appointment of a committee on the subject, appointed at the suggestion of the American Gas Association Testing Laboratory. An extensive program of appliance testing on liquefied petroleum gases is now being set up, to be carried on at the A. G. A. Laboratory.

Other topics brought before the meeting centered around the subject of safety in appliances and service equipment, and that of insurance problems.

For increasing local benefits of N.B.G.A. membership the Association contemplates establishment of sectional organizations on the west coast and in the midwest. Organized for the past four years, the Association has brought both marketers and appliance firms into closer contact, with many mutual benefits resulting.

Ensign Carburetor Establishes Office in Tulsa, Okla.

Ensign Carburetor Co., Los Angeles, announces that it will maintain a complete line of Ensign natural gas carburetors, Ensign combination gas and gasoline carburetors and parts in Tulsa, Okla., for Mid-Continent and Gulf Coast distribution. A. W. Schuler, Inc., of Tulsa, and Buda Engine Service of Tulsa, Inc., will also carry complete stocks of Ensign equipment for sales and service.

Ensign Carburetor Co. is also represented in Oklahoma City, Okla., by D. Binkley Co., and in Houston, Texas, by Portable Rig. Co., distributing in the Texas and Gulf Coast area.

New Lease Plans Bring Increase in Customers

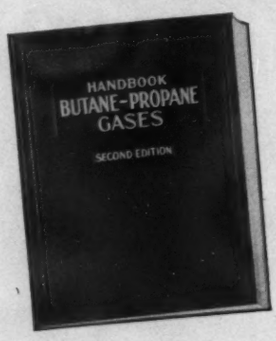
Recent estimates on the basis of sales by major companies indicate that between 15,000 and 20,000 new bottled gas customers have been added since March 1 of this year in area east of the Rocky Mountains, largely as a result of the new lease plans which went into effect about that time. Numerous of the larger companies lowered their lease charges on bottled gas sets from $36.50 or thereabouts to $9.75. Another major company instituted a $15.00 lease deposit, refundable in the event that the equipment is given up by the customer, on the basis of a $3.00 annual service charge.

Southern Oregon Gas Corp. New Distribution Developments

Installation of a butane-air plant and larger gas mains and conversion of the Grants Pass, Ore., manufactured gas distribution system for serving butane-air gas were completed early in August by the Southern Oregon Gas Corp. Fred A. Anderson, Jr., is district manager.

The company has also begun work on the construction of a butane-air plant in Roseburg, Ore., completion of which is expected early in September.

THE ONLY HANDBOOK OF BUTANE–PROPANE GASES



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Mech. Engineer Seeks Connection as Butane Plant Operator

Engaged for the past six years in the design, erection and operation of butane-air gas plants, a mechanical engineer seeks a connection in the same capacity with a large company interested in the operation of liquified petroleum plants. In addition to these qualifications he has had business office instruction and is familiar with most types of accounting systems used by utilities. *Western Gas* will be glad to forward inquiries to the applicant.

Modernization of El Centro Distribution System

Construction work involving the gradual modernizing and changing over from low pressure service to high pressure butane-air service in the El Centro, Calif, distribution system during the past several years was recently completed by the Natural Gas Corp. of Calif. The rehabilitation program included the laying of larger mains, and the installation of pressure regulators at every meter.

To Manage Washington Properties

Austin Shepard of Portland, Ore., has been appointed general manager of the Natural Gas Corp. systems at Port Angeles and Port Townsend, Wash.

NATURAL GAS—

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MODEL "HOME OF TODAY"

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In design and in construction, nothing was spared that would add to the comfort, convenience and endurance of this modern home. It is luxurious.

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Control Systems

C. M. Grow Retires from Southern Calif. Gas Co.

IN line with Southern California Gas Co.'s retirement plan, in effect for the past several years, C. M. Grow, new business manager and oldest employee in point of service, left his active association with the company on September 1.

C. M. Grow

Mr. Grow's activity in western utility companies goes back some 42 years, during which period he has filled executive positions in both gas and electric branches. He entered utility work on January 6, 1893, as assistant manager of the San Antonio Light & Power Co., which operated the first high tension transmission line in the world, serving Claremont, Pomona and San Bernardino, Calif. This company was purchased five years later by the San Bernardino Electric Co., supplying street lighting in San Bernardino, with Mr. Grow as manager.

Reorganization into the San Bernardino Gas & Electric Co. followed shortly, with Mr. Grow as director and general manager. The property now included a gas plant of 15 coal gas retorts purchased from the San Bernardino Gas Light Co. In 1899 Mr. Grow installed the second water gas generator on the Pacific Coast in improving this plant, and a year later replaced the remaining coal gas equipment with the second oil gas set on the Pacific Coast.

Another bit of pioneering was the installation in 1907 of 15 miles of high pressure main and distribution system, taking gas at 50 pounds pressure from San Bernardino to Highland.

Pacific Light & Power Co., Wm. G. Kerchkoff and A. C. Balch property, in 1903 bought the San Bernardino Gas & Electric Co., bringing high tension power to San Bernardino and Riverside counties; Mr. Grow was division manager for these counties, operating four hydroelectric plants and a gas plant.

Intensive promotion of gas sales under Mr. Grow's direction resulted in absorption of other gas properties in San Bernardino, Colton, Redlands and Riverside by the Kerchkoff-Balch interests, between 1903 and 1917. When Pacific Light & Power bought the Domestic Gas Co., then serving part of metropolitan Los Angeles, calling it the Southern California Gas Co., one of the early steps was introduction of natural gas to Riverside and San Bernardino, about 1913.

In 1917 Mr. Grow came to Los Angeles as new business manager of the Southern California Gas Co., which position he held until his retirement.

His service to the gas industry, outside of his immediate company interests, has included two years chairmanship of the Pacific Coast Gas Association Commercial Section, 1926-1927, during both of which the Commercial Section was accorded the Basford Trophy for outstanding work.

During his period with the Southern California Gas Co., 1917 to 1935, he has seen total meters increase from 50,000 to 270,000, industrial customers grow from 4 to 700, and appliance sales from $250,000 a year to $2,000,000.

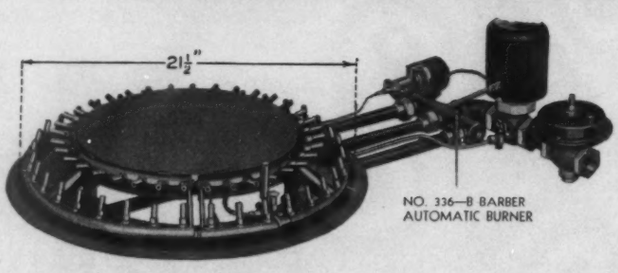
Mr. Grow was instrumental in pioneering use of natural gas in internal combustion engines for water pumping and miscellaneous industrial power purposes, which represents a major load in Southern California. He also has encouraged gas refrigeration from the first, bringing the original consignment of two carloads of refrigerators to the West Coast, and organizing the "Southern Servel Club" made up of gas refrigerator users in the Southern California Gas Co. staff. Another major application of natural gas which Mr. Grow had a leading part in promoting was that of steam heating in major buildings. Beginning about 1923 this load has gradually been developed to a point where gas is the accepted fuel.

His long service in the industry has been accompanied by many civic contributions, notable among these being his interest in the National Orange Show at San Bernardino. He is a past president of the Orange Show and is now serving on its directorate.

Mr. Grow's friends in and out of the western gas industry are legion, and it may be taken for granted that he will be with them at gas industry gatherings for many years to come.

The Trend of the Times

is to BARBER BURNERS!



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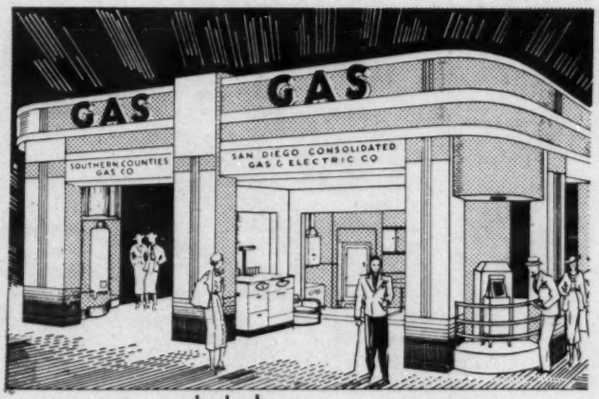
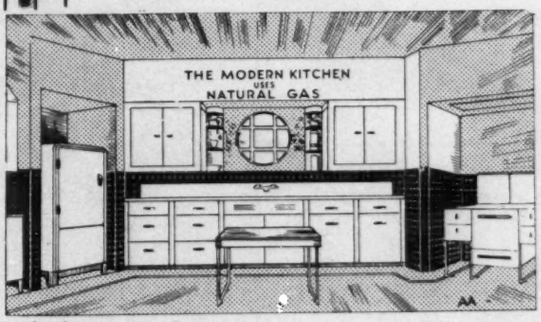
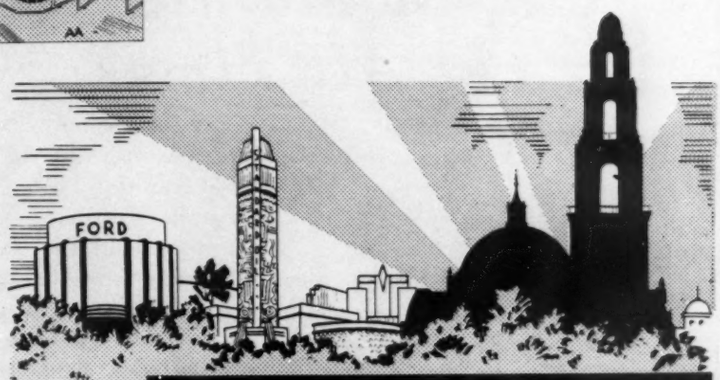


Among the featured exhibits at America's Exposition is the display of Natural Gas equipment located in the Palace of Better Housing. Dedicated to the American Housewife, this exhibit, by working demonstrations, portrays the remarkable progress in gas-fired appliances.



Why not make this exhibit your meeting place at the Fair?

Please consider this both an invitation and an assurance that your visit among us will be thoroughly enjoyed and long remembered.
W. F. Raber, President



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Fulton Duplex Vacuum Regulator

ON a system discharging gas to a line under light pressure, the Fulton Duplex Vacuum Regulator will definitely prevent the pulling of a vacuum and will maintain atmospheric pressure at all times. When pressure in the storage tank falls, the valve closes. This is a valuable safeguard. Full description and prices will be mailed on request.

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OR ANY JOBBER

Community Natural and Municipal Gas of Dallas Merge

MERGER of Municipal Gas Co. and Community Natural Gas Co., both of Dallas, Texas, under the name of Community Natural Gas Co., became effective August 1. Chester L. May, formerly vice-president and general manager of the old Community Natural Gas Co., has been appointed to act in the same capacity for the consolidated company. L. B. Denning, Jr., has been named general superintendent.

The serving area of the new company, comprised of about 300 towns in Texas and Southern Oklahoma, is broken into four divisions with headquarters and division superintendents as follows: Abilene, M. L. Bird, superintendent of the former Community Natural's Western Division; Sherman, J. Y. Wheeler, formerly manager of the Oklahoma Division; Corsicana, L. W. Cole, formerly secretary and assistant treasurer of Municipal Gas Co.; Waco, C. V. Allin.

L. B. Denning is president of the new company, and F. L. Chase, president of the former Community Natural Gas Co., becomes chairman of the board.

Northern Natural to Install Two Booster Plants

NORTHERN Natural Gas Co. has completed purchasing agreements and just launched the construction of two new compressor stations for its main line extending from Kansas and Texas fields to Minneapolis.

Three units of 1,300 h.p. Cooper Bessemer engines will go into a new plant at Mullinsville, Kan., at the point where the 24-inch line from the south joins the 26-inch line and where the Panhandle Eastern line, transporting gas for the company from the Hugoton fields, connects with the main line.

Three units of 1,300 h.p. Worthington engines will go into a new station being constructed at Beatrice, Neb. An 800 h.p. unit will also be added to the compressor station at Ogden, Iowa, where two other units of the same capacity are in operation. Construction on the projects has commenced with plans calling for the completion of the work early in the fall.

Texhoma Natural Constructing Three Compressor Units

Texhoma Natural Gas Co., affiliated interest of Natural Gas Pipe Line Co. of America, is starting construction about September 1 on three additional 1250 h.p. compressor units at its Fritch compressor station in Texas. Twelve units of 1250 h.p. each are already in operation at the Fritch station.

Texhoma Natural gathers gas for the Chicago line through two main 24-inch trunk lines, one extending into the western and the other into the eastern portion of the Texas Panhandle gas fields.

Carl R. Webster Passes

Carl R. Webster, with the Southern California Gas Co. since 1932, died recently followning a throat operation. At the time of his death Mr. Webster was in the capacity of sales representative in the company's Kern Division, having been transferred recently to that location from the San Joaquin Valley Division at Visalia.

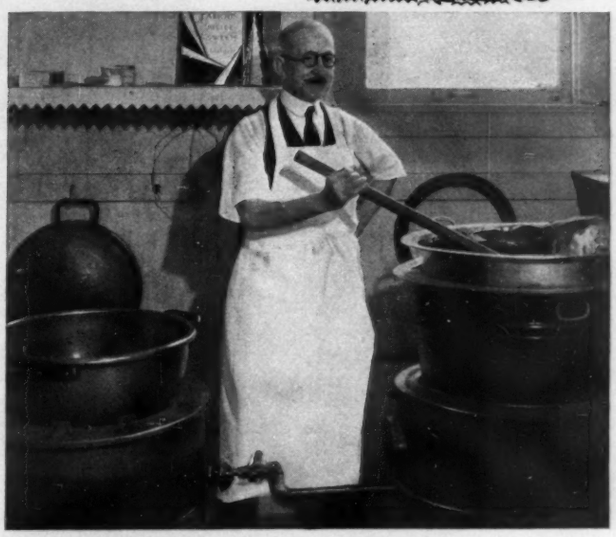
SOME advertisements won't be passed by. They kindle quick interest, touch off the spark of imagination and burn lasting images upon memory's fleeting pages. ¶ Even trade journal advertising, too often dull and drab, may dramatize the commonplace and endow salesmanship with warm human-interest. ¶ If you were engaged in the candy business, a reader of "Western Confectioner and Ice Cream News," would you not be stopped and intrigued by the advertisement reproduced at the right?—Would it not leave a vivid impression: *Experience, testifying in favor of Gas, the Modern Fuel?* And therefore would you not be more receptive to the solicitations of the gas company's or appliance dealer's salesmen? ¶ Multiply this by scores of "ads," many industries and millions of impressions. That is how the Gas Industry's cooperative advertising *works,* month after month, year after year, for you.

Publicity and Advertising Section
J. S. Spaulding (L. A. G. & E.) Chairman

Cooperative Advertising Committee
A. C. Joy (P. G & E.) Chairman

●

"Allegretti's Chocolates and Bonbons"



Mr. G. Allegretti "in person" demonstrates his ability as a batch mixer, at his gas-fired candy kettles, San Francisco.

"Get your Allegretti's chocolates and bonbons!" Between the acts and after the show, Chicago's theatre aisles and lobbies of the 1900 era echoed to this familiar call.

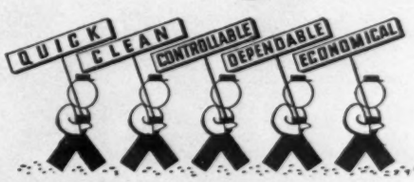
From the old Palmer House there flowed a continuous stream of Allegretti's famous candies for 25 years. Then they all but disappeared from the national market.

But 1927 found Mr. G. Allegretti back in business, this time in San Francisco, where the delicious flavor and quality always associated with this old and honored name, have brought ever-increasing sales.

Completely gas-equipped, the Allegretti San Francisco factory is as modern as its name is old. "Of course I use gas," says Mr. Allegretti. "No other fuel offers the same advantages of cleanliness, exact control, uniformity and low cost."

Ask your Gas Company about new gas-fired candy appliances and how they can save and make money for you.

Gas
The modern industrial fuel



PACIFIC COAST GAS ASSOCIATION, INC.
(A non-profit service organization of which your Gas Company is a member)
447 SUTTER STREET, SAN FRANCISCO, CALIFORNIA

Santa Cruz

Experienced world travelers have been unanimous in pronouncing Santa Cruz one of the country's ideal beauty and year round vacation spots. It combines the pleasures of sea bathing, fishing on the sunny side of Monterey Bay, with the delightful cool of a redwood wonderland in the mountains.

Santa Cruz extends her hospitality to utility men and their families in all parts of the country at all times of the year.

★

Santa Cruz is the Home of the General Office of

Coast Counties Gas & Electric Company

U. S. SUPER DeLAVAUD

CAST IRON PIPE

Made by

U. S. PIPE & FOUNDRY COMPANY

BURLINGTON, N. J.

Sales Offices and Foundries Throughout the United States

Rules of F.H.A. Loans Liberalized to Include Renters

As a result of recent changes in the rules covering F.H.A. loans with respect to the purchase of gas appliances, renters as well as lease holders or property owners are now eligible for government loans. Consequently, the requirement that appliances must be permamently attached has been waived, and in general any household fixture "capable" of being permanently attached, the cost of which is sufficient to warrant a time payment plan to effect purchase, can now be paid for out of F.H.A. loans.

As recently announced, F.H.A. loans may also now be obtained up to $50,000 for rehabilitating and re-equipping apartment houses, multiple family houses, office, business or other commercial buildings, hospitals, orphanages, colleges, and manufacturing or industrial plants.

Lone Star Continues Billing Old Rate

Lone Star Gas Co. has filed a petition with the Texas Railroad Commission asking that the recent rate reduction ordinance be set aside and also asking for an increase in present rates. Meanwhile Fort Worth, Texas, consumers are being billed at the old rates and the company has offered to post bond of assurance for a rebate to customers in the event the lower rates should be confirmed.

The rate question was brought up in connection with the City's anti-dilution order of August 8, and at a special hearing D. A. Hulcy testified that the new rates set by the city for domestic gas would cost the company $344,473.

The new rates were ordered by the city council August 9; they are 75c for the first 1,000 cu. ft. (old rate, $1.25 net), 60c per 1,000 cu. ft. for the next 19,000 cu. ft., 57c for next 10,000, 52c for next 20,000, and 42c per 1,000 cu. ft. for all over 50,000 cu. ft.

Contract Let on North Central's 150-Mile Pipe Line

It is understood that contracts have been let to Williams Bros. of Tulsa, Okla., to lay North Central Gas Co.'s 150-mile pipe line, reported construction of which was covered in *Western Gas* for June. The line will connect Clayton, Wyo., to Bridgeport, Neb., and will cost the North Central Gas Co., Casper, Wyo., about $1,200,000. Twelve-, 10-, 8-, and 6-inch pipe will be used in the construction.

A. J. Hazlett, "Inland Oil Index" Publisher, Passes

A. J. Hazlett, publisher of "The Inland Oil Index" and dean of oil industry writers, passed away at his home in Casper, Wyo., at the age of 70, August 12. Since his entrance into the trade journal field at the turn of the century, Mr. Hazlett's work has been admired and his influence felt throughout the trade journal and oil industries, in which he leaves a host of friends.

Steel Pipe Mfg. by A. M. Byers

A. M. Byers Co., Pittsburgh, Pa., has added the manufacture of steel pipe to its list of wrought iron products.

Southern Calif. Gas. Co. New Business Promotions

THE retirement of C. M. Grow as new business manager of the Southern California Gas Co., Los Angeles, covered on another page of this month's issue, has been followed by a number of changes in the company's general sales staff, among them the following:

W. M. Jacobs, formerly general sales supervisor, assumes Mr. Grow's responsibilities as assistant general superintendent of sales. H. E. Davidson, formerly general supervisor of domestic sales, becomes sales development engineer. His post is filled by J. E. Kern, formerly assistant general supervisor of domestic sales. L. M. Hull, formerly sales supervisor in the company's San Joaquin Valley Division and later industrial representative in Los Angeles, succeeds Mr. Kern.

United Gas System Executives Are Transferred

R. L. McGuire, former district manager of the United Gas System Opelousas (La.) District, has been transferred to Laurel, Miss., to act as manager of the distribution district created following the company's acquisition of gas properties there. D. S. McManus, Lake Charles district manager, succeeds Mr. McGuire as manager of the Opelousas district which serves the towns of Opelousas, Church Point, Elton, Kinder, Oberlin, Oakdale, LeCompte, Cheneyville, Bunkie, Cottonport, Mansura, Marksville and Hessmer.

Lake Charles district managership is assumed by P. H. Chaffin, formerly district manager at Crowley. E. M. Cannon, company sales superintendent for Louisiana, Mississippi and southwest Texas, succeeds Mr. Chaffin as district manager at Crowley.

To Supplement Gas Supply for San Joaquin Valley Towns

Southern California Gas Co. has in prospect for early construction a 10-mile 4-inch line from Lindsay to Porterville, Calif., paralleling a present 3-inch line, according to Wm. Moeller, Jr., vice-president in charge of gas production and transmission. The Tulare supply will also be supplemented by a 8½-mile 4-inch line running south from the 6-inch main line from which Tulare is now supplied.

Republic Steel New Sales Office

Opening of a new sales office at 622 Dwight Bldg., Kansas City, Mo., is announced by N. J. Clarke, vice-president in charge of sales, Republic Steel Corp., Youngstown, Ohio. Robert L. Pierce, of the St. Louis district sales office, will be in charge of the new office.

City of Austin, Minn. Buys Distribution System

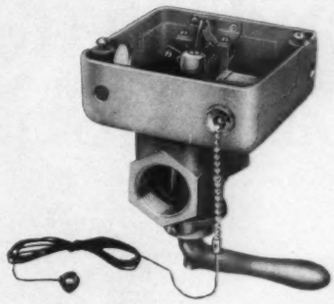
City of Austin, Minn., has purchased the gas distribution system of Austin from the Interstate Power Co. and will take possession October 1. The municipal system will serve natural gas to some 3,000 customers to be supplied from the Albert Lea to Austin line.

Inland Automatic

Gas Cock Switch

for Unit Heaters

A COMBINED STOP COCK AND SUMMER SWITCH



The gas cock switch makes a gas unit heater available for ventilation only, at any room temperature.

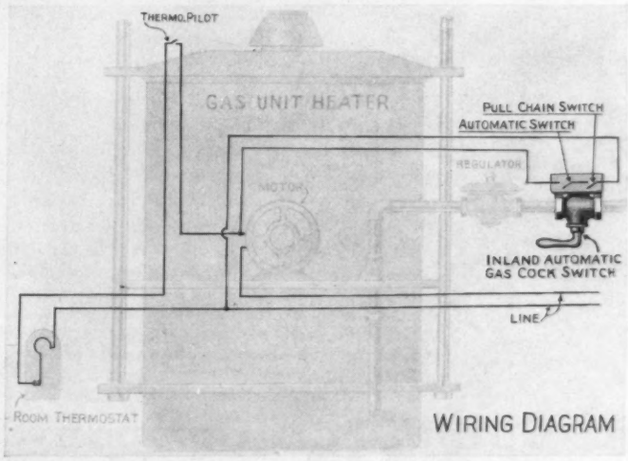
It automatically throws a switch ON, simultaneously with the turning of lever handle to close gas cock, which cuts out pilot and room thermostatic controls. Switch is not thrown ON until gas supply is completely off. Operation of fan on unit heater for ventilation is then controlled manually with a pull-chain switch.

When gas cock is opened to turn gas on to unit heater, switch is thrown OFF automatically before any gas passes through cock, bringing pilot and room thermostats into operation for control of unit. Pull-chain switch will not control fan with gas turned on.

As a shut-off valve of some type is essential on all gas unit heaters, the additional cost of using the gas cock switch is only the difference in costs of the two, plus about 2 feet of wiring to motor.

Simple in construction and operation. No adjustments required.

Can be furnished without pull-chain switch if location of switch to operate fan is preferred at room thermostat.



WIRING DIAGRAM

INLAND MANUFACTURING COMPANY

1120 N. Cicero Avenue Chicago, Illinois

ARCOLA

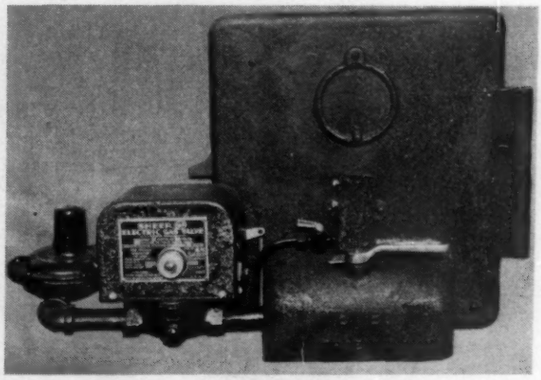
Conversion Burners

Produced by NEMEC are the most beautiful as well as efficient. They are furnished in several models for manual and automatic firing. This automatic model is only $62.50 to gas companies.

•

Nemec Combustion Engineers

WHITTIER, CALIFORNIA



The
ENSIGN
Natural Gas
CARBURETOR
with
Improved
Fuel
Regulator

For
All Types of
Multiple Cylinder
Stationary Engines

Saves Fuel
Prevents Loss of Power
Cuts Power Costs

Ensign Natural Gas Carburetors are adapted to all types of multiple cylinder stationary engines and, where gas fuel is available, offer desirable economies in power costs. The fuel regulator is an improved differential type of compact construction that gives more accurate control and proper metering of gas at carburetor, insuring smooth operation with minimum fuel consumption and no loss of power. Easy starting is assured without priming with either gas or gasoline.

Hundreds of Ensign carburetors in service for many years have proven them to be more economical in fuel consumption per horsepower-hour than any other type of equipment. They are of the straight tube type for which various sizes of venturis are available. Supplied in five sizes from 1-inch to 2-inch inclusive. Write for descriptive bulletin.

Pioneers in the manufacture of scientific carburetting equipment for developing efficient, dependable and economical power for all requirements.

We also manufacture a combination Gas and Gasoline Carburetor that permits using gas and gasoline alternately for fuel in practically any type of multiple cylinder stationary engine.

Ensign Carburetor Company, Ltd.

7010 So. Alameda St. P. O. Box 606. Huntington Park, California.

Mid-Continent Distribution and Service Facilities Maintained By: A. W. Schuller, Inc., 114-116 East Ninth Street, Tulsa, Okla.; Buda Engine Service of Tulsa, Inc., Tulsa, Okla.; D. Binkley Company, Oklahoma City, Okla.; Portable Rig Company, Houston, Texas. Branches: Dallas and Longview, Texas.

In
San Francisco
the
WILLIAM TAYLOR HOTEL

28 stories—overlooking the magnificent Civic Center

Rooms with bath from $2.50

WOODS-DRURY CO. OPERATORS

James Woods, Pres. *Ernest Drury, Mgr.*

Sliding Scale Rate Asked By Community Natural

Application by the Community Natural Gas Co., headquartering in Dallas, Texas, was made to the Oklahoma Corporation Commission asking for a sliding scale natural gas rate, according to Chester L. May, vice-president and general manager of the company. The Community Natural Gas Co. serves 26 cities and towns in Oklahoma, to which the new rates will apply.

The proposed new rate provides for an increase in the first 3,000 cu. ft. of gas used, with sharp reductions as volume increases. Present rate is $1.08 for first 600 cu. ft. and 67½c net per 1,000 cu. ft. for all over 600 cu. ft. The proposed rate starts at $1 per 100 cu. ft. for the first 200 cu. ft.; 80c per 1,000 for the next 2,800 cu. ft.; 60c per 1,000 for the next 2,000 cu. ft.; 50c per 1,000 for next 20,000 cu. ft. and 45c per 1,000 for all over 25,000 cu. ft. The fact that the properties are widely scattered and involve a more than normal amount of pipe line investment per customer with more than 70 per cent of bills rendered being for less than actual cost of service, is the company's explanation of the request for a sliding scale rate.

Stopcock Converts Unit Heater into Ventilation Unit

Inland Manufacturing Co., Chicago manufacturer of gas specialties, has recently developed a combination gas stopcock and switch for gas unit heaters that makes it possible to use the heater for ventilation only, when it is desired. With the switch in operation the fan on the unit heater can be controlled manually with a pull-chain switch.

The action of the cock is to automatically throw a switch simultaneously with the turning of a lever handle which in turn closes the gas cock and cuts out the pilot and room thermostat control. The switch cannot go on until the gas supply is completely off.

When the gas cock is opened in turning on the gas to the unit heater, the switch is thrown off automatically before any gas passes through the cock, at the same time bringing the pilot and room thermostat into operation for the control of the unit. The pull-chain switch will not control the fan with the gas turned on.

F. H. A. Essay Contest for P. G. and E. Patrons

Pacific Gas and Electric Co., San Francisco, through its customer publication, "P. G. and E. Progress," is offering cash prizes for papers of 200 words or less on "How I Used a Federal Housing Loan" or "How I Could Use a Federal Housing Loan," mentioning the appliances and fixtures installed. An award of $15 will be presented for the best article, $5 for the second best and 15 additional awards of $2 each.

Lone Star Begins 109-Mile Line

Construction of Lone Star Gas Co.'s 109-mile 20-inch pipe line from Long Lake and Cayuga gas fields in Anderson County to Irving, Texas, was begun early in August. The new line will have a capacity of 110,000,000 cu. ft. per day and will cost about $2,250,000.

F. H. Holden Returns to Activity in Gas Industry

F. H. Holden

F. H. Holden, until 1933 advertising manager for the Southern California Gas Co., and until recently secretary of the Printing Trades Association in Los Angeles, is again connected with the gas industry in Southern California as representative of the Natural Gas Bureau. The Bureau is sponsored by the Los Angeles Gas & Electric Corp., Southern California Gas Co. and Southern Counties Gas Co., and in his new capacity Mr. Holden will have charge of many of the promotional projects which it conducts.

Promotions Announced for United System District Managers

W. H. Langston, district manager at Marshall, Texas, for United Gas Public Service Co., has been transferred to supervise certain company activity in the East Texas oil fields where he was formerly stationed during the early part of the company's developments there.

W. B. Currey, Southern Gas Utilities, Inc., district manager at New Braunfels, Texas, succeeds Mr. Langston in the Marshall post. Sam Ricks, formerly of the Seguin office and later of the San Marcos office, was promoted to district superintendent at Kennedy, Texas.

Health Appeal Stressed in Heating Compaign

Taking its cue from this statement in the "Fort Worth Press": "Physicians stressed the fact that overheated, drafty homes were one of the chief causes of colds which so often develop into influenza, pneumonia and attendant ills," the Lone Star Gas Co., Dallas, Texas, is developing advertising copy for an informative campaign to gas customers of the dangers of improperly heated homes. The campaign will point out that overheated homes and poor heating facilities are responsible for a large part of winter ailments.

Supplemental London, Ky., Gas Supply

To supplement the London natural gas supply connection of the Edwards & Eversole Gas Co., London, Ky., distribution system with the Petroleum Exploration Co.'s trunk line was scheduled for completion September 1. The project called for a 4-inch 4½-mile pipe line which was being laid by the Petroleum Exploration Co.

Plan 115-Mile Pipe Line in N. D.

Minot Gas Co. and the City of Minot, N. D., are reported to be planning application for Federal funds for the construction of a 115-mile pipe line from Williston, N. D., to supply natural gas to Minot. The proposed line would tap the Montana-Dakota Utilities Co. gas line at Williston.

N.G.E. Type "R"
satisfactorily solves conversion problems for ROUND BOILERS

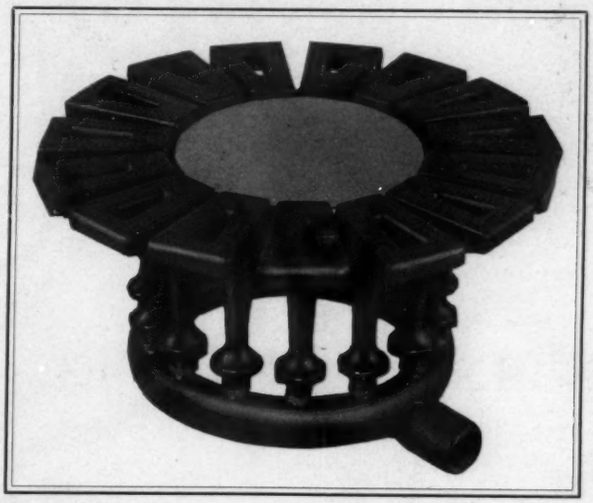
The success of conversion burner equipment in commercial heating installations depends largely on these two factors:

Application of proper equipment to the particular installation.

Certainty of efficient, economical operation of equipment after installation.

The N. G. E. Type "R" Burner successfully meets these requirements. First, its installation is recommended as burner-equipment for round furnaces, such as Arco Boilers and warm air furnaces. Second, because the type "R" completes combustion as rapidly as possible in a limited furnace area, it permits longer travel of the products of combustion along heating surface of the boiler, thereby effecting highest efficiency with maximum fuel economy.

The type R burner (illustrated) consists mainly of a series of drilled port burner heads, complete with venturi tube and spud, arranged on a circular manifold. Consumers utilizing these burners have realized the advantages of increased savings in fuel, and lowest maintenance costs together with the cleanliness and controlability of gas.



FEATURES: Requires but little headroom, allowing maximum furnace area to be used for liberation of heat; flexibility of burner arrangement permits installation in any particular size furnace; individual burners have small orifice assuring intimate mixing of primary air with gas, secondary air required from combustion is brought up through burner head and not through center of burner.

The N. G. E. LINE includes:
N. G. E. Gas Burners.
N. G. E.—Wilgus Gas Fuel and Pressure Regulators.
N. G. E.—Industrial Burner Equipment.

Write for New Bulletin.

NATURAL GAS EQUIPMENT INC.

1123 Harrison St., San Francisco | **Petroleum Securities Bldg., Los Angeles** | **Arizona Dist. Crane Co.**

LOOK TO THE PIONEERS FOR CONTINUED LEADERSHIP

WHILE IN PASADENA,

Delegates to the Pacific Coast Gas Association Annual Convention are invited to visit our plant and investigate the convenience of ART CONCRETE SECTIONAL METER BOXES for curb installations, which are becoming increasingly popular.

Complete protection for curb meters. Furnished in combinations suitable for single or multiple set-ups, low and high pressure. Length of box readily extended without removal of initial installation. Knockouts for pipe connections. Reinforced concrete covers and lids are standard and cast iron, optional.

Also curb valve boxes in different sizes, fitted with break-away grooves for varying depths.

ART CONCRETE WORKS

Originators and Manufacturers

366 S. Fair Oaks Ave., Pasadena | 2400 Adeline St., Oakland

The Picture Bridge of California Scenes

at

THE HUNTINGTON HOTEL

Headquarters 42nd Annual Convention

Pacific Coast Gas Association

September 17-20, 1935

Send reservations to: S. W. ROYCE, *Manager*

THE HUNTINGTON PASADENA, CALIFORNIA

REFRACTORIES

GENERAL CERAMICS COMPANY

REFRACTORIES

For Conversion Burners, Circulating Heaters, etc.

Because they are uniformly accurate, strong, and dependable in every way, General Ceramics Refractories are used by most of the leading manufacturers of gas heating appliances. • Our engineers will gladly cooperate with you.

General Ceramics Company, 30 Rockefeller Plaza, New York

MODERN METHODS AND MATERIALS

A letter to WESTERN GAS will bring you any of the selected reference bulletins listed below, without cost. Indicate by number which you desire.

NO. 78—PORTABLE WELD TEST MACHINE

Apparatus for field testing of welds. Description of operating procedure, preparation of specimens. Alignment chart for computing tensile strength included in illustrated folder.

NO. 79—COMMERCIAL AIR CONDITIONING

Dehydration type air conditioning equipment for large installations utilizing gas for regeneration of drying agent, described in four-page folder, with cutaway illustrations.

NO. 80—INSULATION MATERIALS

Full line of specialty insulation materials for heating and power, ovens and dryers, heat-treating furnaces, non-ferrous smelting equipment, hot and cold pipes, fittings, flanges, ceramic equipment, gas-making equipment, refrigeration, etc. Pocket-size 64 page booklet with list prices and description of each product. Illustrated.

NO. 81—HOUSE HEATING LINE

Circulator heaters, radiant heaters, steam radiators, floor and basement furnaces, forced air units, and water heaters. Miniature illustrated catalogue of house heating equipment describing each unit.

NO. 82—METALLURGY OF WELDING

Chemistry and physics of oxy-acetylene steel welding. Contains 5 pages with illustrations, including discussion of metallurgical factors in development of modern welding rod and comparative advantages of oxy-acetylene welding.

NO. 83—GAS TESTING

Apparatus for B.t.u. determination, testing for sulphur and ammonia, and hydrogen sulphide. Bulletin contains descriptions and illustrations of the above and of wet and dry types of pressure governors, and specific gravity apparatus.

NO. 84—CLAMPS AND SADDLES

Clamps for 10 different types of pipe line repairs, three types of service saddles, pipe benders, valve and bibb reseaters, and bibb dressers. Description of applications and tables showing available sizes. Illustrated in color.

NO. 85—HEATING EQUIPMENT

Line of radiant heaters for inserting in hearth with and without mantels, portable radiant heaters of period design, replacement burners and radiants, cabinet heaters, warm air units and gas lamps. Illustrated in color and described as to capacity, etc., in a 20-page book.

NO. 86—COMBUSTION CONTROL

Basic problems of boiler operation and an evaluation of efficiencies of controlled combustion. A 32-page book with drawings showing application of control apparatus.

Gordon Greene Sales Engineer for Robinson Orifice Fitting Co.

Gordon Greene

GORDON Greene, gas measurement engineer for Associated Oil Co. and connected with that organization for the past 13 years, has joined the Robinson Orifice Fitting Co., Los Angeles, as sales engineer, effective September 1. During his term with Associated Mr. Greene was engaged in gas accounting, measurement, and related work. He has held various committee posts with the Southern California Meter Association, and is now chairman of entertainment for the California Natural Gasoline Association.

C. W. Bradley Presented with 30-Year Service Pin

C. W. BRADLEY, vice-president of the Public Service Co. of Northern Illinois has been presented his 30-year service pin by the company. The presentation was made by Britton I. Budd, president of the company in the presence of friends and associates of Mr. Bradley.

Beginning service with the Northwestern Gas Light and Coke Co., predecessor to Public Service Co. of Northern Illinois, in 1905, he became gas engineer when the company merged into its present organization, later becoming assistant to the president and in 1924 became vice-president. Prior to his association with the Northwestern Gas Light & Coke Co., Mr. Bradley was employed by the Peoples' Gas Light & Coke Co.

Texas Anti-Gas Wastage Law Upheld in Federal Court

ORDERS of the Texas Railroad Commission regulating the production of natural gas in the Agua Dulce field in Nueces County, have been upheld by a three-judge Federal Court in session at New Orleans. The decision supports the constitutionality of the Texas anti-gas wastage law.

Principal point of contention of the Clymore Production Co., which filed the complaint, was that its wells were oil and not gas wells, and, therefore did not come under the commission's ruling. The claim was discredited at the hearing on the basis of the definition contained in the recently enacted bill, H. B. 266. Texas producers have until next fall to file an appeal to the Supreme Court.

Louisiana Gas Well Completed in New Territory

Testing 16,356,540 cu. ft. per day, the Hunter Co.'s well, located in section 29, township 12 north, range 14 west, De Soto Parish, La., was brought in on July 30. This well is 10 miles from the nearest proven gas or oil field, and may indicate the presence of gas reserves of importance in this territory.

EFFORTLESS HEATING *and* SELLING

MUELLER Gas Era Boiler—compact, efficient, troubleproof—sells easily because the customer can see and appreciate its features. They speak for themselves.

Vertical, converging flues mean cleaner operation, fuller utilization of heat, lower stand-by loss. Other advantages equally sale-winning.

Write for more data on this boiler for steam, hot water, or vapor heating—and other Gas Era gas-fired units. Ours is the most complete line in the industry. Catalog on request.

L. J. MUELLER FURNACE COMPANY
Dept. WG-9 Milwaukee

MUELLER – MILWAUKEE

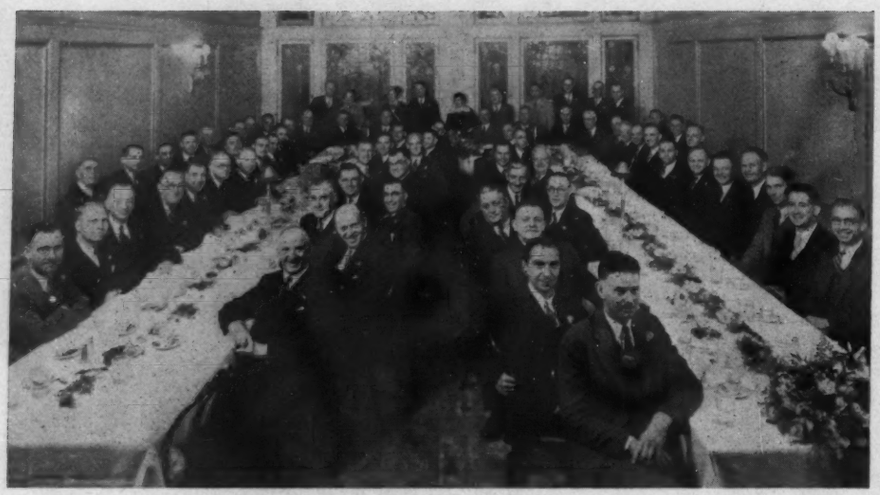
The Goodman Stopper

The Reliable Shut-off for Street Mains

Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

Safety Gas Main Stopper Co.
523 Atlantic Avenue, Brooklyn, N. Y.

Pac. Coast Rep.: C. B. Babcock Co.
135 Bluxome Street
San Francisco, California



Dinner given in honor of Willis S. Yard by P. G. and E. co-workers.

Willis Yard Retires from P. G. and E. Vice-Presidency

WILLIS S. YARD has resigned as vice-president in charge of gas construction and operation of the Pacific Gas and Electric Co., the resignation taking effect on August 1.

Mr. Yard has been prominent in the Pacific Coast gas industry since 1912 when he joined the organization of the Pacific Gas and Electric Co. in the distribution department, San Francisco Division. He was later transferred to the Potrero gas plant, and was placed in charge of the company's gas department in 1919, being made a vice-president of the company some years later.

He has held many offices in the Pacific Coast Gas Association, serving as president of the Association in 1927.

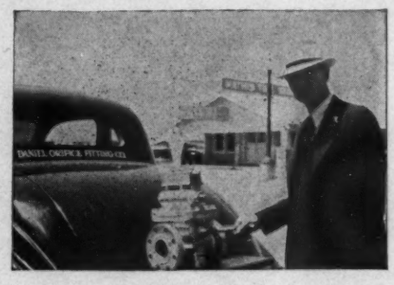
Mr. Yard is a native son of California but received his early education in Salt Lake City. He attended the University of Utah and Cornell University.

At a dinner given to him by some 70 members of his organization from all parts of the Pacific Gas and Electric Co. system on August 9, Mr. Yard stated he had no plans for the immediate future other than to take a good rest. The dinner was a splendid tribute to him and an indication of the deep affection held for him by the men who had worked under him for many years.

F. F. Doyle will continue as manager of the natural gas division of the Pacific Gas and Electric Co., and Ray Fuller now becomes engineer of gas construction and operation.

To Represent Daniel Orifice Fitting in Mid-Continent

G. W. Daniel has been appointed manager of mid-continent and eastern sales for the Daniel Orifice Fitting Co., Los Angeles.



He will tour the mid-continent and eastern producing fields with a specially equipped sales and demonstration car.

The Daniel Orifice Fitting Co. has recently added to its line a new Kettleman High Pressure orifice fitting for working pressures of 2,000 pounds.

Market Study Covers Data on Fuel and Appliance Use

"Consumer Use of Selected Goods and Services, by Income Classes", Market Research Series No. 5.1, is the title of a new bulletin issued by the Bureau of Foreign and Domestic Commerce. Based on a survey of Austin, Texas, it includes figures on heating and cooking appliances and fuels, and is the first of a number of similar surveys in other market areas, soon to be published.

The bulletin contains 16 tables correlating data on incomes and consumption derived from information on both income and goods reported by the same families.

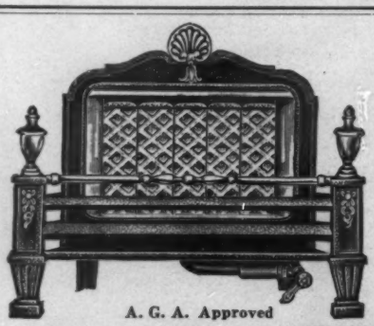
Storage Water Heater Sales Up

Gas storage water heater sales of the Public Service Co. of Northern Illinois are 52.5 per cent ahead of last year up to the middle of August, constituting the best record of sales in the history of the company except for the year 1930.

The dollar volume in sales of all load building appliances is 40 per cent above that for the same period last year.

Produce 36-in. Cast Pipe

American Cast Iron Pipe Co., Birmingham, Ala., has added 36-in. pipe to the range of sizes now produced by its mono-cast centrifugal method. The 36-inch pipe is manufactured in 16-ft. lengths, bell and spigot type with the bead cast on the spigot end.



A. G. A. Approved

PEERLESS
RADIANT GAS HEATERS
◆
—will assist materially in your efforts towards
"LOAD BUILDING"
You need have no fear of a service complaint on a PEERLESS

WRITE FOR DETAILS
PEERLESS MANUFACTURING CORP.
1400 W. ORMSBY
LOUISVILLE, KENTUCKY

AIR CONDITIONING
Electrogas
HEATING EQUIPMENT
FURNACES BLOWERS FILTERS WASHERS
Write for attractive Dealer proposition
ELECTROGAS FURNACE & MANUFACTURING CO.
2575 Bayshore Boulevard, San Francisco

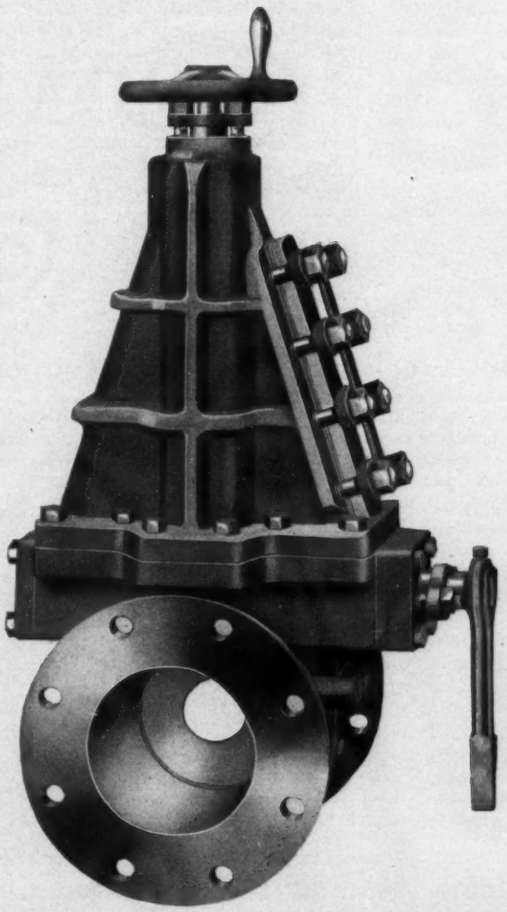
We Have Waited 3 Years
to Announce

ROBINSON

TYPE "E"

ORIFICE FITTING

Now after three years of testing we are ready to offer this improved fitting to the industry.



The Robinson Orifice Fitting Company started several years ago to develop this type "E" fitting. Realizing the advantage of a complete re-design which would incorporate the principles proven in the field by past fittings coupled with the simplicity of construction and speed of operation demanded by modern industry.

Write for pamphlet giving complete description of new features and prices.

ROBINSON ORIFICE FITTING CO.

1435 Santa Fe Ave., Los Angeles

WESTCOTT & GREIS, TULSA—DALLAS—HOUSTON

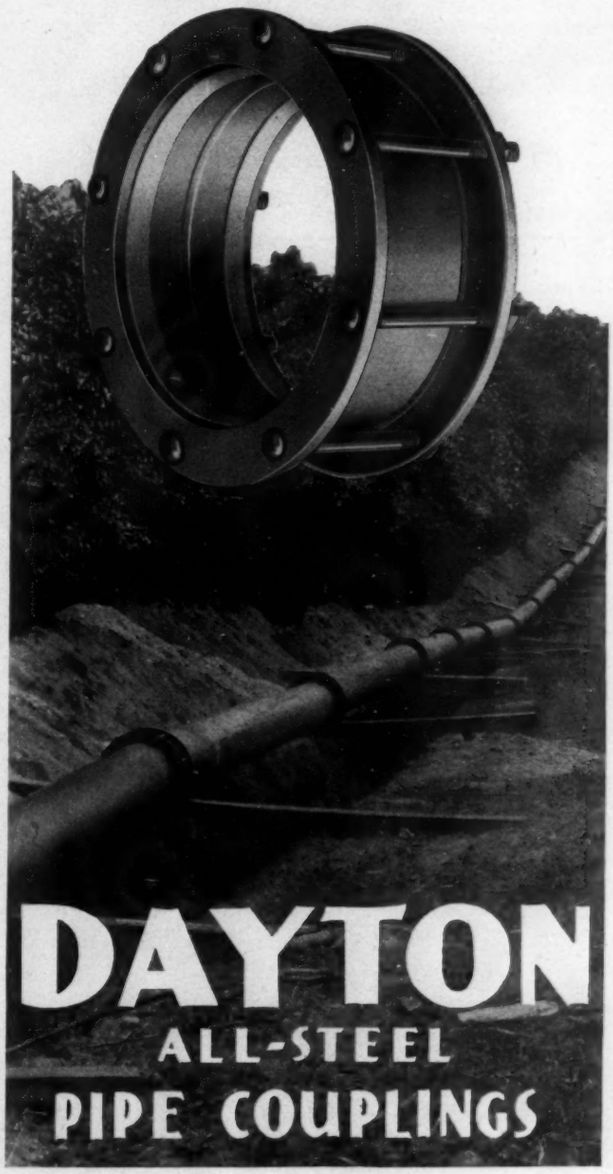
PERMANENCE
FLEXIBILITY
STRENGTH

Three qualities that, for nearly a third of a century, have enabled Dayton Couplings to render economical, dependable service in the installation and maintenance of gas lines under all conditions.

THE NATIONAL-SUPERIOR CO.

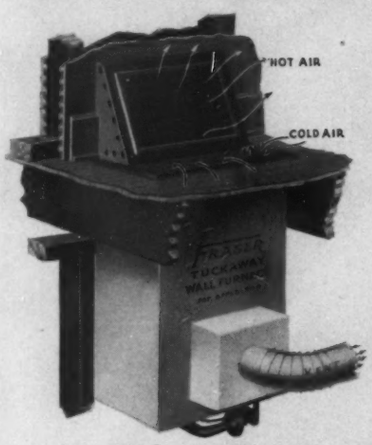
DAYTON PIPE COUPLING DIVISION

DAYTON, OHIO



Welsbach
HOTZONE
Self-action storage gas water heaters

Approved by A. G. A. Laboratory
Heaters are made in all domestic sizes with 300 lb. test galvanized or Everdur tank.
Write for Details
WELSBACH COMPANY
Gloucester City, N. J.
SAN FRANCISCO, CALIF. CHICAGO, ILL.

FRASER
TUCKAWAY FURNACE


An entirely new idea in Furnace Construction
Made in 4 sizes
Manufactured by
Fraser Furnace Company
Stockton, Calif.
Distributed by
H. R. Basford Company
San Francisco Los Angeles

27-Day Campaign Produces Sales Over $20 Per Meter

MERCHANDISE sale of a little over $20 per domestic meter in a period of 27 days was the record achieved by the Peoples Gas Co., Port Arthur, Texas, in a recent range and refrigerator campaign. Port Arthur has a population of approximately 50,000 with 8,500 meters. Net sales totalled about $185,000, representing 670 refrigerators and 323 ranges, and these results were secured by a sales organization made up of six salesmen and one sales supervisor.

Last January 1, the Peoples Gas Co. retarded all sales activities so far as the company was concerned and left this activity to the local furniture dealers with the understanding that they would push gas appliances, giving them substantial advertising support and helping them through its sales organization and home service department. Sales fell off rapidly and the electric competitor stepped in with an electric range campaign featuring free trial, free installation, no down payment and a 36-month payment plan, which resulted in displacing about 75 gas ranges. These terms, of course, could not be met by the dealers and the gas company therefore proceeded to launch its campaign.

In the advertising no mention was made of trade-in allowance, price or the number of months the campaign would run. It merely stressed that the No. 1856 Magic Chef range was offered at $1.25 down and $1.25 per month, the No. 35 Electrolux at $3.00 down and $3.00 per month, or a combination of these units at $4.25 down and $4.25 per month. Other numbers and units were offered on the same payment plan in proportion to size and price. These offers were merely leaders; the average price for ranges sold was $80, and $230 average for refrigerators.

W. A. McIntyre, manager of the company, attributes the phenomenal success of the campaign largely to the application of some fundamental sales psychology. The sale was purposely delayed one week in order to build up a whispering campaign based on curiosity. The salesmen were instructed to make one contact in each block during the week, announcing that the most unusual gas appliance sale of all time would shortly be in progress, giving the housewife no particulars of the campaign, but telling her to watch for the announcement ad in the Sunday papers.

Curiosity on the part of the public spread until it became the talk of the town. On Friday and Saturday come-on ads were run calling the public's attention to watch the Sunday paper for details of the offer. After that Mr. McIntyre reports it was largely a matter of order taking.

The campaign was supported with full page advertising and window displays featuring modern gas ranges and Electrolux refrigerators.

Columbia System 18-Week House Heating Campaign

AN 18-week house heating contest is in progress throughout the Columbia System, according to B. H. Gardner director of sales. The campaign began July 15 and will close November 16. For contest purposes the distributing territories have been divided into two classes—Division A, territories having less than 50,000 meters, and Division B, those having more than 50,000 meters.

Prizes will be awarded on the basis of annual gas load represented by the appliance sold. A separate quota for each group within the divisions has been set up for M c.f. per group and M c.f. per customer. Group prizes are as follows: Division A, first prize, P. G. Gossler trophy (an imposing silver cup) and $200 cash award; second prize, $100, and third prize, $50; Division B, first prize, P. G. Gossler trophy and $600 cash award, second prize $350, and third prize $150. Individual prizes for salesmen having highest total estimated annual M c.f. range from $200 for first prize to $10 for twelfth prize.

The campaign is divided into six periods of three weeks each, and cash prizes of $15 each will be awarded the ten salesmen ranking highest in each of the six periods. No salesman is eligible to receive more than one of these prizes during the campaign. The five salesmen having the highest M c.f. annual consumption during the period from July 15 to September 28 will win a trip to the A.G.A. Convention in Chicago.

Appliances being sold during the campaign include boilers, furnaces, conversion burners, circulating heaters, unit heaters and radiant heaters.

P. G. and E. Building Milpitas-San Francisco Line

PACIFIC Gas and Electric Co., San Francisco, is expecting first deliveries of pipe for its newly announced 22-inch 45-mile natural gas pipe line from its Milpitas terminal, 6 miles north of San Jose, to the Potrero gas plant in San Francisco about the middle of September, according to information supplied *Western Gas* by F. F. Doyle, manager of P. G. and E.'s natural gas division. Contract for supplying the pipe has been awarded to Western Pipe and Steel Co., San Francisco, and calls for about 8,600 tons of steel pipe at a cost of over $800,000. The project will require a total expenditure of more than $1,500,000. Construction will be pushed ahead rapidly, with completion set for December 1.

The new line will parallel the present 20-inch line from Milpitas for part of the route, then turn north through Sunnyvale, cross the campus of Stanford University, continue through the town of Woodside and follow north along the western slope of the Peninsula to terminate at the end of a 26-inch main extending from the Potrero plant. The 26-inch main, which extends to Junipero Serra Boulevard, was built in anticipation of the new line from Milpitas.

In addition to augmenting San Francisco's gas supply from the Kettleman Hills and Buttonwillow fields, the new line will serve Woodside and several other areas on the west side of the Peninsula not now supplied with natural gas.

Gas Service Rental-Purchase Plan for House Heating

New business departments of the Gas Service Co. group, headquartering in Kansas City, Mo., launched a house heating equipment rental campaign August 1. The application of the rental-purchase plan to conversion burners, space heaters and unit heaters resulted from the success of the plan for water heaters that was started in March.

The plan features no down payment and no payments during the summer months, the customer paying only for those months that the appliances are in actual use, the first payment being added to his September gas bill. In the event the customer decides to purchase, he is allowed a discount of 20 per cent on the balance due after deducting total rental payments.

Monthly payments on domestic size conversion burners are $2.75; payments on space heaters range from $1.30 to $2.40; and on unit heaters, sizes from 60,000 B.t.u. to 200,000 B.t.u., from $4.00 to $10.30.

Lindsborg, Kan., Gets Municipal Distribution System

Completion of the municipal gas distribution system of Lindsborg, Kan., was expected in the latter part of August. The system will be fed from the Dickey refinery through a 4-inch, 13.9-mile pipe line. The community is now served by the Kansas Pipe Line and Gas Co., and the city estimates that there are 400 prospective customers in excess of those on the company's distribution system.

EHFA Reorganized to Operate on National Scale

NEWEST cloud on the gas load-building horizon was the announcement last month that the Electric Home and Farm Authority has been reincorporated and reorganized to give its operations national scope. Retail sales of electrical and plumbing equipment will be financed both in cities and rural areas.

The EHFA has borrowing power in addition to its original capital and will lend for purchase of electrical household appliances and farm machinery, and also on plumbing equipment to be used in connection with electrical equipment, such as sinks, inside bathrooms, running water systems, etc. Operations will follow the general pattern of the original EHFA in TVA area, with purchase of appliance contracts from dealers and such utilities as can be "persuaded" to participate. Use of the program to force electric rates to lower levels may be expected.

Newly elected officers of the reorganized Authority are, Morris L. Cooke, Administrator of Rural Electrification, president; Max O'Rell Truitt, solicitor of the Reconstruction Finance Corp., general counsel; William A. Weaver, treasurer, and A. T. Hobson, secretary. G. D. Munger continues as Commercial Manager. The operations of EHFA will be directed by a board of nine trustees—Mr. Cooke, Gladding B. Coit, George R. Cooksey, Thomas G. Corcoran, Sam Husbands, John K. McKee, Emil Schram, Mr. Truitt, and Morton McCartney.

The headquarters of EHFA is at Chattanooga, Tenn.

Detroit City Gas Co. to Serve Natural Gas to Industries

On August 30 the Detroit City Gas Co. announced completion of contracts with the Panhandle Eastern Pipe Line Co. to bring natural gas into Detroit for industrial purposes. The announcement came as a surprise to the City of Detroit council which was planning to submit a $4,000,000 bond issue to voters of the city in October to cover construction of a municipal gas distribution system. Negotiations had also been in progress between Panhandle Eastern and the city for natural gas supplies.

Last month Texas Governor James V. Allred's project for a state-owned gas line from the Panhandle to Detroit was also being pushed, with an application on file at the P.W.A. Fort Worth office for a loan and grant of some $46,000,000, submitted by the governor and the Texas public works committee, to cover costs of the undertaking.

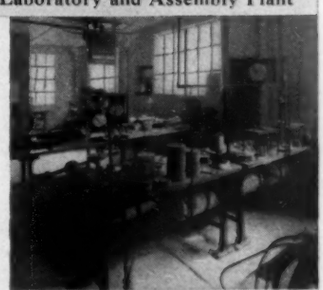
Inertol Opens So. Calif. Office

Inertol Co., Inc., of New York, has opened a Southern California office in Los Angeles at 1340 E. 6th St. with H. A. Knoedler in charge.

SEND US your recalibration work

and save several weeks' time

Bristol's West Coast Service Laboratory and Assembly Plant



Perhaps you, too, have on hand a number of old Bristol's Recorders that now, after a long period of fine service, need reconditioning. Or that should be modernized in order to measure under the different conditions and within the different ranges your processes today require.

If so, send them direct to us. Don't think of going to the expense and delay of having this work done several thousand miles away.

Pack recorders carefully and ship to 311 Minna St., San Francisco. Mail order authorizing work to nearest office.

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Branch Offices: Rialto Bldg., San Francisco..747 Warehouse St., Los Angeles..Branch Factory: 311 Minna Street, San Francisco.

BRISTOL'S

TRADE MARK REG. U.S. PAT. OFF.

PIONEERS IN PROCESS CONTROL SINCE 1889

Semitropic and Tracy Areas Important in California

INTENSIVE drilling for new gas reserves is under way in California's new Semitropic dry gas area in Kern County, San Joaquin Valley, with some 10,000 acres already proven as productive by the 16 completions made to date. A 30-day flow test is under way, through a temporary 8-inch surface line laid into the field by Standard Oil Co., delivering into Pacific Gas and Electric Co.'s present Buttonwillow line. This test will determine the size of the permanent 10-mile gathering line which will tie into the P.G. and E. Buttonwillow carrier, according to F. F. Doyle, manager of P.G. and E.'s natural gas division.

Drilling already extends over an area about 7 miles long by a mile in width, and the field gives every indication of being the largest dry gas area in the State. Construction of the 10-mile line linking the field to P.G. and E.'s system is expected immediately. Southern California Gas Co. is also expected to tie into the new field, though no announcement to this effect has yet been made.

Standard Oil Co. and Fullerton Oil Co. each hold about 40 per cent of the proved acreage at Semitropic, while Continental-Milham and Superior control about 8 per cent each.

Another gas discovery of tremendous potential importance to Northern California is that of the Amerada Petroleum Corp. of California a mile north of Tracy. Last month this company brought in its No. 1 35,000,000-foot discovery well in this area, which lies only 55 miles by pipe line from San Francisco. With only one well down in this new area it is too early for definite plans for gas delivery from that source, though early developments in this direction are to be expected. Representatives of the P.G. and E. participated in production tests on the No. 1 well last month.

A.G.A. Refrigerator Sales Campaign Winners Announced

JOHN J. QUINN, chairman of the A. G. A. Refrigeration Committee, has announced the winners of the seven silver trophies or "Prosperity Cups", and accompanying cash awards, in the nation-wide gas refrigerator sales campaign conducted throughout April, May and June. The contest was carried on by the committee in collaboration with the manufacturers of Electrolux. Participating companies competed in seven different divisions depending on the number of meters served. Awards to individual salesmen was a feature of the campaign, there being more than 500 of these in all.

Winners of the "Prosperity Cup" are as follows:

Division A (companies serving in nine metropolitan districts)—Boston Consolidated Gas Co.

Division B (companies serving 40,001 or more meters)—Providence Gas Co.

Division C (companies serving from 20,001 to 40,000 meters)—Birmingham (Ala.) Gas Co.

Division D (companies serving from 10,001 to 20,000 meters)—Union Gas System, Inc., Independence, Kan.

Division E (companies serving from 5,001 to 10,000 meters)—Florida Public Service Co. of Orlando.

Division F (companies serving from 1,001 to 5,000 meters)—Tyler (Texas) Gas Co.

Division G (companies serving less than 1,000 meters)—Broad River Power Co., Florence, S. C.

Rate Cut Presages Active Heating Campaign in Seattle

SEATTLE GAS CO., Seattle, Wash., serving 500 B.t.u. manufactured gas, has filed a new optional heating rate which will apply to all domestic service where gas is the sole source of heat in residences. This rate is a reduction in some cases of as much as 45 per cent on the heating bills of customers who have large homes, and is more than 20 per cent under former rates for customers who have a typical five-room house. The rate is also available to apartment houses, commercial and industrial customers for volume water heating.

The former rate for heating service, expressed in 1/10-therm units, was 1.5c per unit for the first 200 units per month per meter, 1.1c per unit for the next 300, and 1c per unit over 500 units. Under the new rate the 1.5c per unit charge applies only to the first 150 units. Next 250 units are billed at 1.1c; next 500 at .8c, and all over 900 at .6c.

When the new schedule is applied to space heating alone, the $1.00 per month customer charge is waived during the months of July, August and September. The company's purpose in filing these new rates, according to James F. Pollard, vice-president and general manager, is to put its heating costs at a level where they will compete on a dollar-for-dollar basis with the cost of oil heating. Considerable success is being had with sale of conversion burners. The company is selling the Zink conversion burner for warm air furnaces, installed with hand-set thermostat for $99.50, or with full eight day clock control thermostat for $129.50.

Vinet New Business Supervisor for Kansas Electric Power

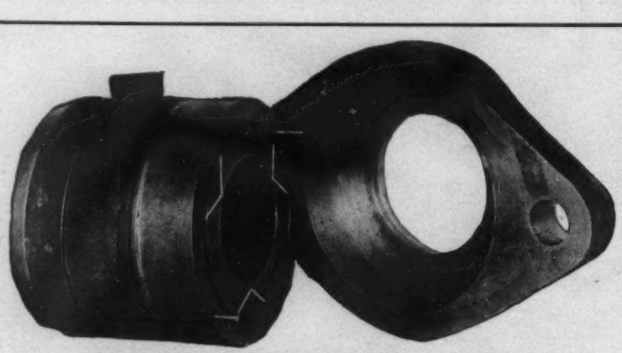
Pierre Vinet, who recently resigned his position as district manager at Pittsburg, Calif., for Coast Counties Gas and Electric Co., is now located at Parsons, Kan., as new business supervisor for The Kansas Electric Power Co. While on the west coast Mr. Vinet was active in Pacific Coast Gas Association work, holding the general chairmanship of the Commercial Section in 1934.

Texas Legislature to be Offered Utilities Regulatory Bill

A bill to regulate Texas utilities is being drafted for presentation at the special session of the Texas legislature in September, according to R. E. Rouer, Fort Worth city attorney. The bill is designed to create a commission of three members with full power to control and regulate utilities in Texas.

Sioux Falls Replacement

At a cost of $10,000 the Sioux Falls Gas Co. will replace 3- and 4-in. service with 1,800 ft. of 10-in. low pressure mains in downtown Sioux Falls.



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Metallic Packing

A segmental ring packing that does not have to be filed during its opeartive life. An improved form of force feed lubrication floats the rings and makes an oil seal, and minimizes the tendency to wear the top of the rod. Made for clean as well as corrosive conditions.

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INCORPORATED IN TEXAS
MANUFACTURERS OF
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and Specialties

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CONSULTING ENGINEERS

General design engineering, investigations, reports and estimates, and construction supervision for new or modernization projects in the utility or industrial fields

231 SOUTH LA SALLE STREET • CHICAGO

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MODERN HORIZONTAL BORING MACHINE

For Underground Installation of Pipe and Conduits. Avoids damage to costly pavements and saves time. Send for Bulletin.

HYDRAUGER CORPORATION, Ltd.

116 New Montgomery St. • San Francisco, California

Rust Preventatives, Asphalts—Plastics—Industrial Paints—Tank Treatment and Repairs. ProtectaKote Pipe Line Coatings

NON-CORROSIVE PRODUCTS CO., LTD.

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WESTERN GAS

810 So. Spring St., Los Angeles, Calif.

Gentlemen: Starting with the next monthly issue, you may send WESTERN GAS to the undersigned. Upon receipt of your invoice, remittance will be sent to cover (1 year $2.00) or (2 years $3.00). Other than U. S. $3.00 per year.

Name .....

Title .....

Company .....

Address .....

City and State .....

Date .....

Marking a great forward step in modern gas cookery

A striking Wedgewood creation destined to revolutionize gas range designs and gas cookery! Incomparably different in every way. Exactly the kind of range every woman has long awaited. Combines Table-Top beauty with Kitchen-heater utility and convenience.

of course it has the ASTOGRIL BROILER

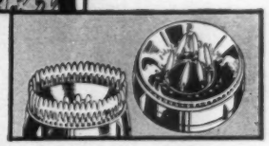
Sears Broiled Food on both sides at once, sealing in healthy, tasty, natural juices. Ends smoke, flaming fats and odors. Its aluminum Rotor-disc is easily cleaned.

AMPLE SPACE TO COOK and WORK

Wedgewood's Closed-Top is noted everywhere for its excellence and bigness. Extra work space gained by using waist-high oven top.

Instantly Convertible from MEALTIME EFFICIENCY to SPOTLESS SPLENDOR

Lowering of drop-top instantly converts Wedgewood's Masterpiece into the most artistic and colorful furnishing in the house! Its distinctive style, exquisite beauty of line and appointments will challenge comparison for years to come. It is truly a Masterpiece in gas range architecture!



of course it has SPEED *plus* SIMMER BURNERS

No gas range could be modern without these wonderful burners that permit healthy, waterless cooking on every top burner. Two independent flames operated by a single valve.

HEATS THE KITCHEN WITH BOTH CIRCULATED AND RADIATED GAS HEAT

JAMES GRAHAM MFG. CO.

San Francisco • Newark • Los Angeles, Calif. Portland, Oregon

WEDGEWOOD'S MASTERPIECE

A. G. A. Gas Range Sales Contest Winners Announced

WINNERS in the A. G. A. first gas range sales contest, conducted throughout the United States and Canada during March, April, May and June, are announced by the Awards Committee for the A. G. A. Domestic Range Committee. Awards are based on the net dollar volume per 100 domestic meters of completely equipped A. G. A. approved gas ranges which each company and its dealers sold during any two-month period from March 1 to June 30. For contest purposes the competing companies were divided into six divisions based on the number of meters served. First prize winners in their respective divisions are named below:

Division I (companies with 100,000 or more meters): Southern Counties Gas Co., Los Angeles, Clyde H. Potter, commercial manager.

Division II (50,000 to 100,000 meters): Portland (Ore.) Gas & Coke Co., B. H. Parkinson, commercial manager.

Division III (20,000 to 50,000 meters): Memphis Power & Light Co., R. C. Anderson, residential sales manager.

Division IV (5,000 to 20,000 meters): Iowa-Nebraska Light and Power Co. (outside properties) Lincoln, Neb., Edward Taber, merchandise sales director.

Division V (1,000 to 5,000 meters): Missouri Natural Gas Co., Farmington, Mo., J. M. Fox, general manager.

Division VI (1,000 or less meters): Georgia Natural Gas Corp., Thomaston, Ga., L. E. Hurst, superintendent.

The first place winners as well as those placing second and third will receive a certificate of excellence in addition to a cash award for distribution among company and dealer salesmen, and seven companies in each division received honorable mention.

Executive Changes in A. L. & T. Subsidiaries

CHESTER N. CHUBB, for four years president of the Muskegon Gas Co. and president of the American-Michigan Pipe Line Co. since its inception two years ago, has resigned to become president of the San Antonio (Texas) Public Service Co. Glenn M. Chamberlain, vice-president and general manager of the Grand Rapids Gas Light Co., succeeds Mr. Chubb as president of the pipe line company. Both Michigan companies as vice-president of the American Light & Traction Co., has become president of the Muskegon Gas Co. and vice-president of the pipe line company. Both Michigan companies as well as the San Antonio Public Service Co. are American Light & Traction Co. subsidiaries.

Pfeiffer Leaves Public Service Co.

Walt J. Pfeiffer in the advertising department of the Public Service Co. of Northern Illinois has left the company for a position with the Walt Disney Studios of Hollywood, Calif.

Location of this pipe line lay through a swamp in which even the shallowest trench soon became filled with water . . . an obviously troublesome construction problem. It was solved by the use of Mono-Cast Doublex Simplex Centrifugal Pipe, which was assembled on skids above the trench, then lowered into place. For literature on this pipe write American Cast Iron Pipe Co., Birmingham, Ala.

Association Formed to Sponsor Montana-Minnesota Line

NORTHWEST Independent Gas Producers' Association has been formed to sponsor a natural gas pipe line about 1,650 miles in length from Cut Bank, Mont., across Montana and North Dakota to Duluth, then south to Minneapolis and St. Paul. From the Twin Cities the proposed line would turn west through southern North Dakota to tap the Baker-Glendive field in Montana.

E. B. Coolidge, Montana independent gas and oil operator, was elected president of the organization at a meeting in Minneapolis last month. John W. Schmidt, Anoka, Minn., was elected vice-president; C. Leonard Smith, Montana gas producer, second vice-president; Dr. F. J. VanDrasek, Minneapolis, treasurer; E. G. Evansta, assistant treasurer; Louis Sachs, Minneapolis, secretary; and Charles Henning, assistant secretary.

Promotion of the project has been under way since late spring, a committee representing Montana natural gas producers having secured endorsement for it from numerous towns on the Iron Range in Minnesota, together with that of Duluth and St. Paul city councils. Interests promoting the line state that low priced natural gas would revolutionize the treating of low grade ore on the Iron Range and stimulate the mining industry of that region.

P. G. and E. Planning Direct Operation of Several Subsidiaries

Eight companies in which the Pacific Gas and Electric Co. is chief stockholder applied to the California State Railroad Commission late in August for authority to dissolve, and asked that P. G. and E. be permitted to take over their stock. Companies involved were the following: Great Western Power Co. of Calif. and subsidiaries; Great Western Power Co.; City Electric Co.; Feather River Power Co.; Napa Valley Power Co.; California Electric Generating Co.; Mount Shasta Power Co.; Sierra and San Francisco Power Co.

Combined capitalization of the above companies amounts to 212 million dollars.

Modesto Gas Co. was expected to file a similar application.

San Joaquin Light and Power Corp. and Midland Public Service Corp., P. G. and E. subsidiary companies, are not involved in the above plan thus far.

Union G. & E. Extensions in Cincinnati Environs

Union Gas & Electric Co., Cincinnati, Ohio, is extending its distribution system to Mt. Washington, a suburb of Cincinnati, according to E. A. Munyan, gas department manager. The community will be served through a line approximately 4 miles long, the majority of which will be 12-inch cast iron pipe with Dresser couplings, from the Cincinnati supply of 860 B.t.u. mixed gas. The ultimate number of consumers to be served will be 500.

The company is also starting a 4-inch, 14-mile transmission line from Huntsville, Ohio, to the city limits of Cincinnati, using 40-foot lengths of steel pipe and Dayton couplings.

Announcing

THE MUELLER-GROBLE *Evenflow* REGULATOR

From 10 to 1200 cu. ft. per hour with no drop in pressure • Minimum lock-up pressure • No complicated parts or adjustments • May be sealed to prevent tampering • Made in ¾ in., 1 in. and 1¼ in. sizes.

Furnished with or without seal.

•

Spring or dead weight type.

•

For manufactured, natural or liquefied gases.

THE advantages of EVENFLOW regulation are available for any Mueller-Groble regulator in the ¾ in., 1 in. and 1¼ in. sizes by changing a few parts at slight cost. (Dead Weight regulators may be changed on the job in five minutes without disturbing the diaphragm).

MUELLER CO., DECATUR, ILL.

Factories: Decatur, Ill.; Chattanooga, Tenn.; Los Angeles, Calif.; Sarnia, Ont.

Branches: New York and San Francisco

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of the new 52-page Mueller-Groble Catalog.

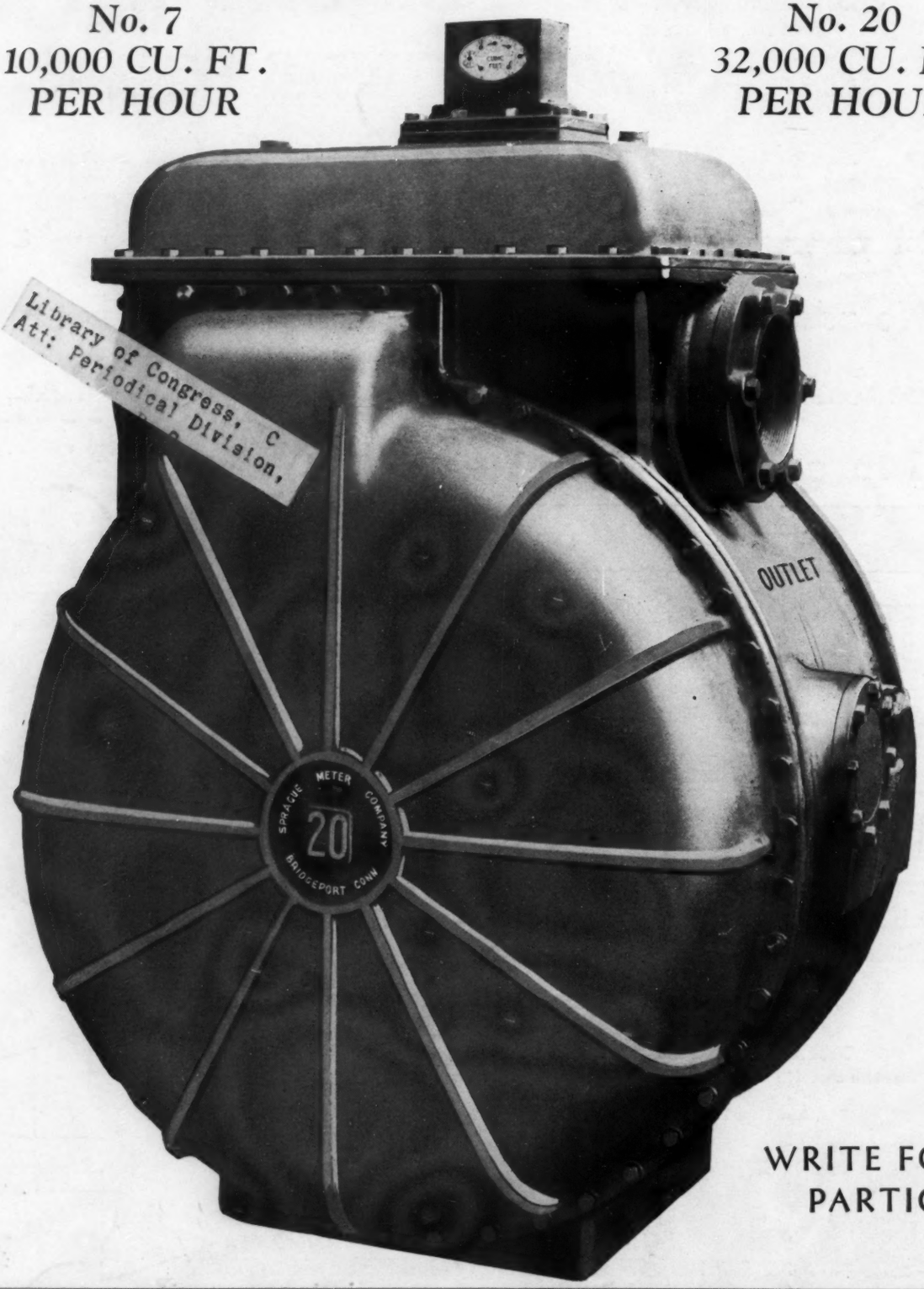
MUELLER

GROBLE LINE GAS REGULATORS

SPRAGUE METERS FOR INDUSTRIAL PURPOSES

No. 7
10,000 CU. FT.
PER HOUR

No. 20
32,000 CU. FT.
PER HOUR



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Att: Periodical Division,

WRITE FOR PARTICULARS

THE SPRAGUE METER CO., BRIDGEPORT, CONN.